'68' MICRO JOURNAL

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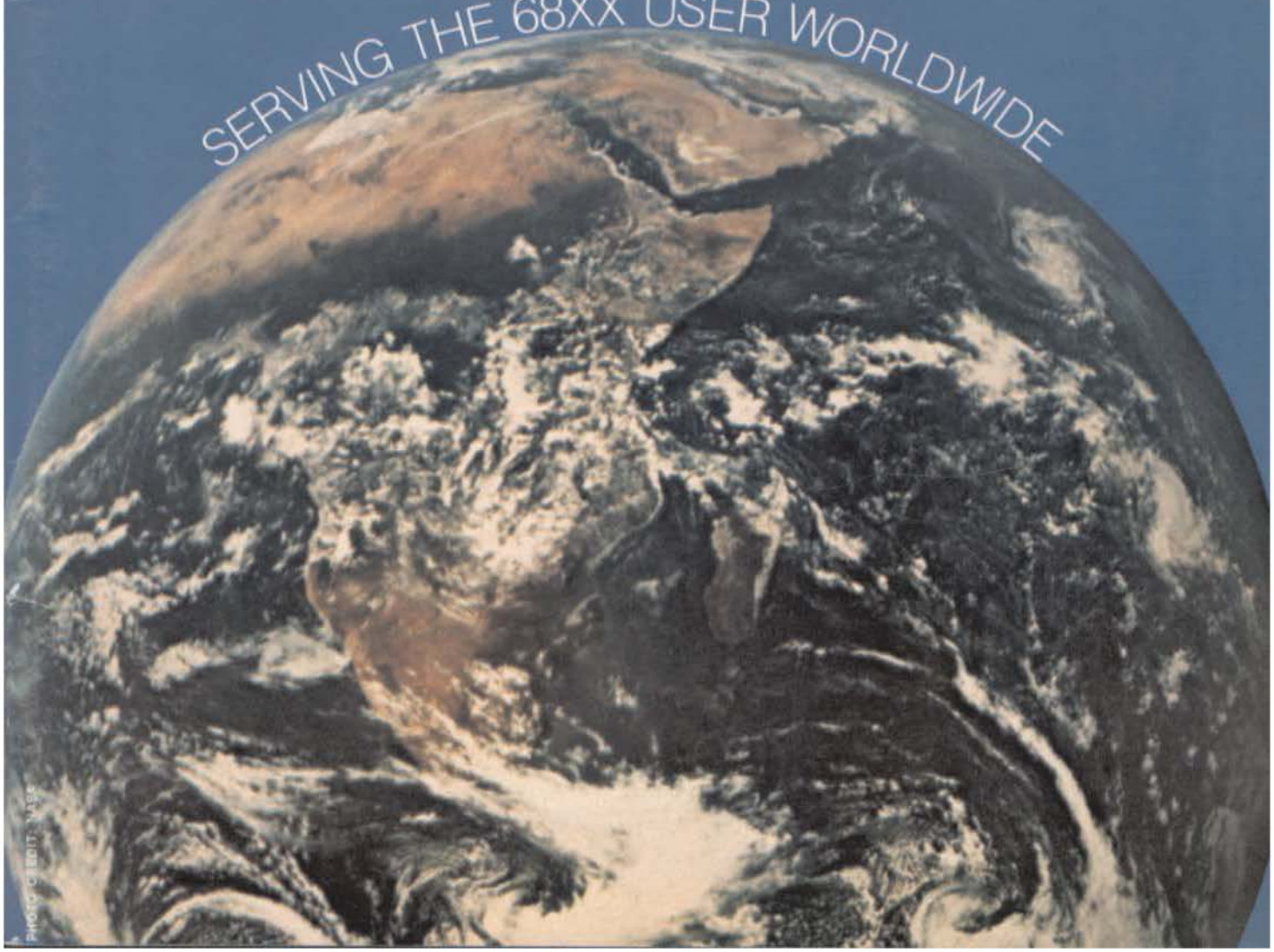
VOLUME IV ISSUE II • Devoted to the 68XX User • February 1982

"Small Computers Doing Big Things"



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Pascal for 6809

Pascal for the 6809 is a true native code compiler. Unlike the usual P-code Pascals which run in an interpretive manner, ours produces efficient assembly language mnemonics which can be assembled and run directly. This compiler is available for both 6809 FLEX™ and UniFLEX™. Many features not found in other Pascal systems were implemented while avoiding those features completely non-standard. Features of the Pascal system include:

- Supports most of Jensen and Wirth specification
- Produces fast and efficient 6809, native code
- FLEX run-time package may be trimmed
- Double precision real numbers (16.8 digits)
- Implements scalar, subrange and structured data types
- Standard I/0 using file buffer pointers
- Dynamic storage allocation
- Ability to call other Pascal programs
- FLEX version may call assembly language programs
- Buffered or single character terminal input
- Standard math functions: SIN, COS, ARCTAN, EXP, LN, SQR, SQRT
- Random number generator function
- Many usable, sample programs included
- UniFLEX version supports:
  - Random file positioning
  - Ability to call various UniFLEX system routines
  - Ability to execute UniFLEX utility commands

Pascal on diskette for 5" and 8" 6809 FLEX is available for $200.00 The 5" version requires two disk drives. The UniFLEX version is $300.00 and includes one year of maintenance. All orders should include 3 percent for postage and handling (10 percent on foreign orders).

™FLEX and UniFLEX are trademarks of Technical Systems Consultants, Inc.

technical systems consultants, inc.
Box 2570, West Lafayette, IN 47906
(317) 463-2502

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Portions of text prepared using the following.

SWTPC 6800-6809-DMAF2-CDS1-CT82-Sprint 3
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EDITOR - WORD PROCESSOR
Technical Systems Consultants, Inc.
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GIMIX Super Mainframe-Assorted memory boards
GIMIX Inc.
1337 West 37th Place
Chicago, Il 60609

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February 1982
VOL IV ... ISSUE II

CONTENTS

Send All Correspondence To:

68 MICRO JOURNAL
5900 Cassandra Smith
Computer Publishing Center
PO Box 849
Hixson, TN 37343

615 842-4600

'68' Micro Journal is published 12 times a year by '68' Micro Journal, 6131 Airways Blvd., Chattanooga, TN 37421. Second Class postage paid at Chattanooga, TN. Postmaster: Send Form 3579 to '68' Micro Journal, PO Box 849, Hixson, TN 37343.

1-Year $24.50,2-Year $42.50,3-Year $64.50

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(Letters to the Editor for Publication) All 'letters to the Editor' should be substantiated by facts. Opinions should be indicated as such. All letters must be signed. We are interested in receiving letters that will benefit or alert our readers. Praise as well as gripes is always good subject matter. Your name may be withheld upon request. If you have had a good experience with a 6800 vendor please put it in a letter. If the experience was bad put that in a letter also. Remember, if you tell us who they are then it is only fair that your name 'not' be withheld. This means that all letters published, of a critical nature, cannot have a name withheld. We will attempt to publish 'verbatim' letters that are composed using 'good taste.' We reserve the right to define (for '68' Micro) what constitutes 'good taste.'

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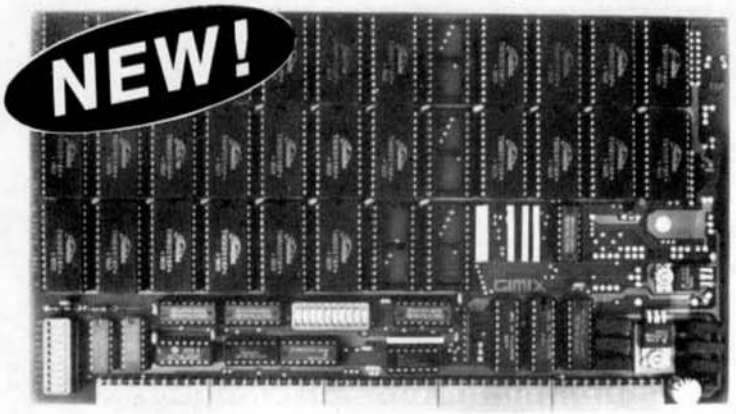

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All versions have gold bus connectors and are fully socketed, assembled, burned in, and tested. Versions with less than 64K can be expanded at any time by adding additional RAM chips.

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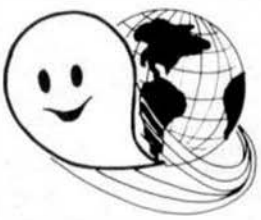

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CIS COBOL™:

The Natural Choice For Business Software

COBOL has been the universal business programming standard for nearly two decades. COBOL is rich in commercially-oriented facilities. It has powerful file handling, formatted printing, and data structure capabilities. It is English-like, so that programs are easy to read and maintain. By far, most organizations use COBOL as their main business programming language. One effect of this is that more professional business programmers know and use COBOL and the best business application software is written in COBOL.

Microware has developed the 6809 version of Micro Focus's proven CIS COBOL compiler to allow you to run ANSI 1974 standard COBOL on your OS-9 based computer system. It's been certified as such by the U.S. General Services Administration, following stringent testing. This assures that CIS COBOL is compatable with standard minicomputer or mainframe COBOLs. And CIS COBOL has been proven on thousands of micro and mini systems all over the world.

Stability is an important advantage of COBOL. Unlike some other languages, a firm standard has been established. Because of this, COBOL programs can be transferred from one machine to another with a minimum of modifications. COBOL users can take advantage of the mass of existing programs written in COBOL.

CIS stands for Compact, Interactive, and Standard—the most desirable qualities for microcomputer COBOL. And CIS COBOL offers you much more! It has been specially designed for interactive operation and efficient use on small computers. CIS COBOL has multi-user capability that allows more than one COBOL program to be run simultaneously. CIS COBOL extensions for conversational applications, screen control, interactive debugging, and OS-9's device-independent I/O system.

CIS COBOL's optional FORMS 2 program generator eliminates the need to write simple data entry and inquiry programs. It lets you build a screen layout on line at the CRT, then automatically generates COBOL source code programs from your screen definitions. Or you can use it to create the interactive screen handling portions of more complex programs.

CIS COBOL and FORMS 2 can be used with any disk-based 6809 computer system having at least 48K of user RAM running Microware's OS-9 Level One or OS-9 Level Two operating systems.

If you need to create business applications, COBOL is your natural choice. And if you want to run COBOL on your 6809 system—or want easy to use interactive business programming facilities—that means 6809 CIS COBOL.

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C:

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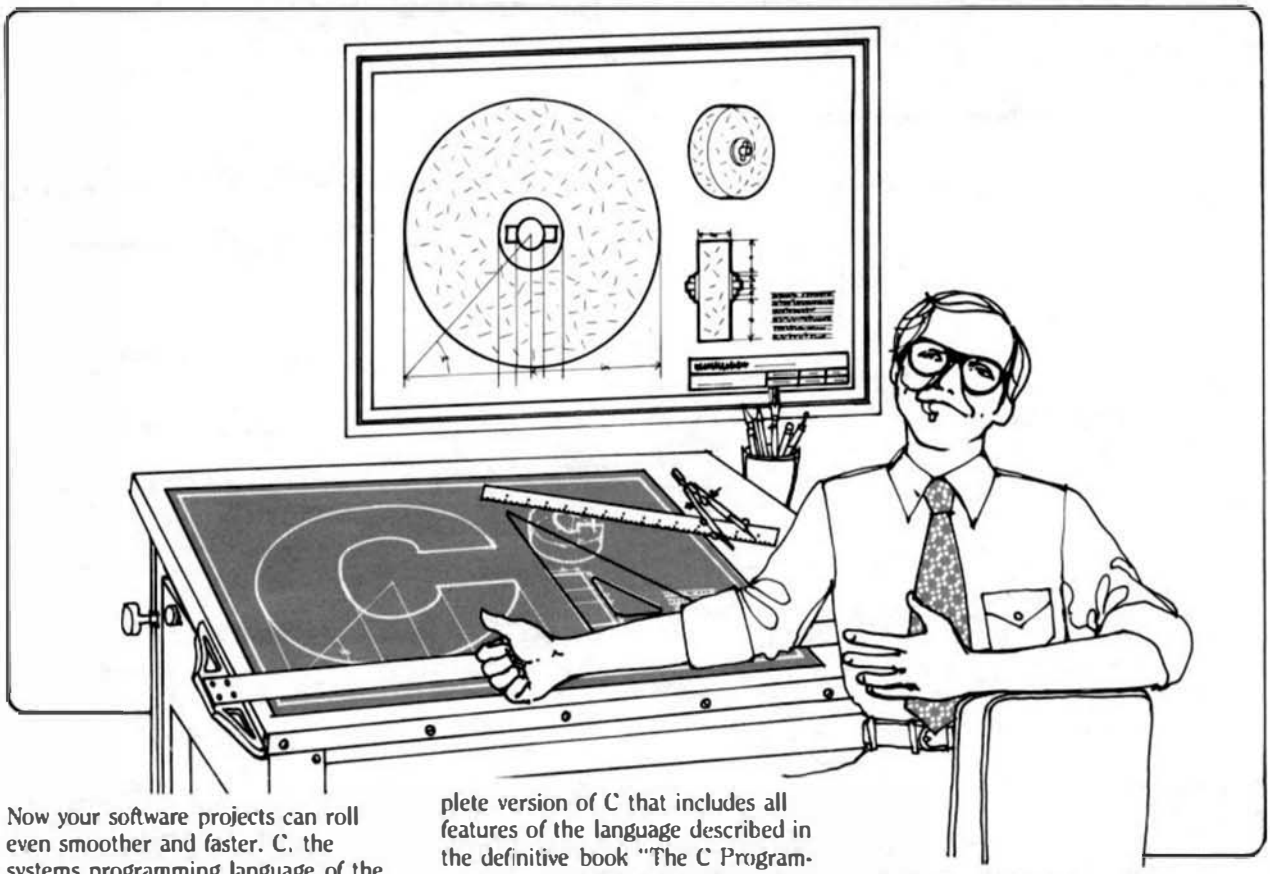

Now your software projects can roll even smoother and faster. C, the systems programming language of the future, is here today for Microware's OS-9 Operating System. Professionals rave about C because it's a structured language that can handle the most demanding real-time applications or painlessly produce simple system software.

When performance counts . . .

Few languages can match C's outstanding ability to produce fast, compact native code. In fact, it is one of a very few languages that is truly efficient enough to be used to produce operating systems, critical real-time programs, and compilers. Because of the richness and variety of C operators and the way they naturally combine, complex functions require less code. Plus the 6809 architecture makes it a superior C machine.

Complete and standard . . .

Microware's new C compiler is a complete version of C that includes all features of the language described in the definitive book "The C Programming Language" by Brian Kernighan and Dennis Ritchie. OS-9 C features: preprocessor with conditional compilation; complete standard function library; char, int, long, and float data types; pointers, register variables, arrays, structures, and unions; one-pass compilation; and assembly language source code output.

The bridge to Unix and the future . . .

Because Microware's C compiler has essentially all features of Unix C, and because the OS-9 operating system is a Unix-type operating system, C programs readily move between OS-9 and Unix. And it is becoming apparent that C will be the preferred programming language for all popular 16-bit microcomputers. As a result, software written in C is inherently protected against processor obsolescence and is assured portability to all latest-generation microprocessors including the 68000.

Plus the OS-9 connection . . .

C is the latest member of the broadest line of 6809 software tools in the industry: Microware's OS-9 family. All OS-9 system functions are directly callable from C programs. The C compiler utilizes the standard OS-9 Text Editor and Assembler, and can process data files used by Basic09, Pascal, and Cobol.

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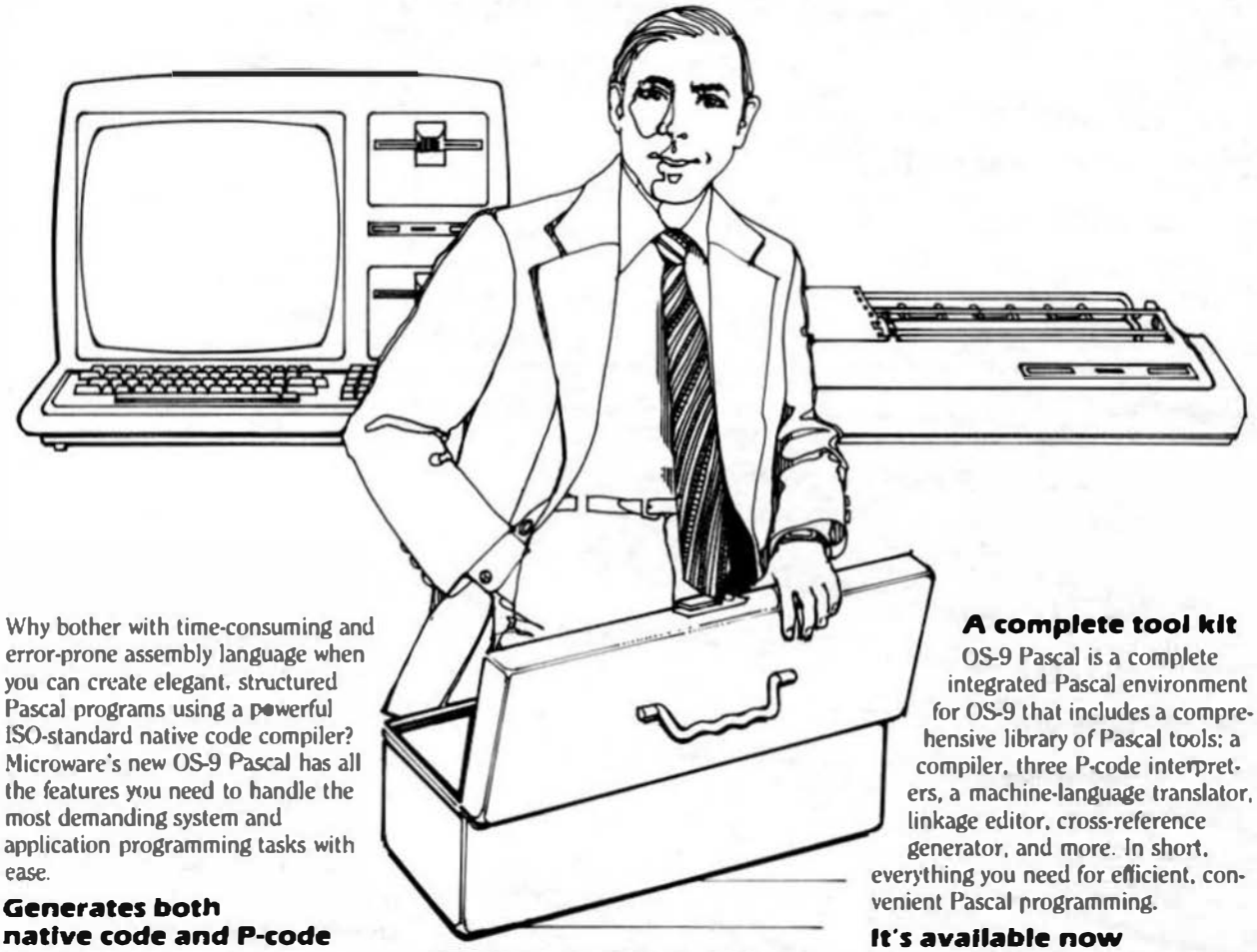
OS-9 PASCAL™:

A New Programming Tool For Experts



Why bother with time-consuming and error-prone assembly language when you can create elegant, structured Pascal programs using a powerful ISO-standard native code compiler? Microware's new OS-9 Pascal has all the features you need to handle the most demanding system and application programming tasks with ease.

Generates both native code and P-code

With OS-9 Pascal you don't have to make that difficult choice between easy-to-use P-code Pascal or fast native-code Pascal. You can compile your Pascal program to pure 6809 assembly language source code. OS-9 Pascal performs extensive local and global code optimization which results in incredibly fast and compact machine language programs. Or if you prefer, OS-9 Pascal can generate P-code for interpretive execution to simplify program debugging and testing. There's also a Virtual Memory P-code Interpreter that can run huge Pascal programs that other microcomputers can't touch. In fact, you can run programs using any combination of P-code, compiled machine language, or handwritten assembly language procedures.

ISO Standard Pascal Plus

OS-9 Pascal conforms to the ISO industry standard for Pascal, so you are assured of portability to or from any other computer that uses standard Pascal. OS-9 Pascal protects your software investment and gives you access to a vast body of existing Pascal software. Beyond the standard, we've added natural extensions to OS-9 Pascal to make it even more versatile, such as: relaxed identifier syntax; separate procedure compilation; random access file and interactive I/O; bitwise logical operators; run-time error handling; and much more. And because it runs under OS-9, it is inherently multiuser and multitasking.

A complete tool kit

OS-9 Pascal is a complete integrated Pascal environment for OS-9 that includes a comprehensive library of Pascal tools; a compiler, three P-code interpreters, a machine-language translator, linkage editor, cross-reference generator, and more. In short, everything you need for efficient, convenient Pascal programming.

It's available now

OS-9 Pascal is now available *off-the-shelf* in all OS-9 disk formats. It can be used on any disk-based 6809 computer running OS-9 Level One or Level Two. Each OS-9 Pascal package includes the compiler, machine language translator, P-code interpreters, run-time support packages, linkage editor, demonstration programs, and a comprehensive 120-page User's Manual.

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E X T R A

FLEX & RS COLOR COMPUTER

** FLEX and the COLOR COMPUTER **

The 'GOOD NEWS' is now here, the popular and very powerful FLEX™ disk system is now running on the Radio Shack Color Computer™!!

The system can be ordered in parts as needed, OR AS A COMPLETE RUNNING SYSTEM, all you furnish is a color or B&W TV or monitor, and a desire to learn and use the powerful FLEX™ disk system and the Motorola 6809 microprocessor. The necessary software includes the special Technical System Consultants's 6809 General FLEX™ ($150 including the Editor and Assembler). Note that the Editor and Assembler normally sell for $50 each, which means that FLEX™ (special) is only $50 as packaged. Also to mate up the system we offer the following software and hardware packages.

F-mate™: a set of software supplied on 5 inch diskettes. F-mate generates the interface between the disk controller*, FLEX™, editor, assembler, word processor** and the color computer. Simple step-by-step instructions detail the creation of a 'Sysgen' disk and then a final 'bootable' FLEX™ disk for the Color Computer. Included is: EXBOOT which is the power-up boot on disk, EXLOADER is used to load a virgin FLEX.COR when performing a Sysgen operation (the supplied assembler is required). The disk controller ROM is the interface at this stage of the operation. Also included is GETOFF which unloads and offsets needed programs to avoid conflicts in memory utilization. GETOFF can be used as a normal FLEX™ program once the bootable disk is finished. PATCHES is furnished to complete the interface between the new FLEX™ system and the Color Computer. PATCHES patch and make functional various standard TSC utilities and programs including APPEND ASMB COPY EDIT PUTLDR SAVE and others. A special NEWDISK (single side, single density, 35 track) routine allows disks made on the Color Computer to be read or written on other FLEX™ systems, insuring complete transfer of disks from Standard S50 Bus computers.

Additional new software patches are being developed for existing Standard S50 Bus FLEX™ software. They will be advertised as soon as reasonable debugging sessions indicate they function as expected.

COLOR BASIC SAVE & LOAD

A set of utilities will be announced soon. Included in this package will be utilities to LOAD and SAVE the Microsoft BASIC programs you write for the Color Computers ROM BASIC. Fact is that this FLEX™ system does not in any way change the normal Radio Shack BASIC operation. All Radio Shack game-paks and other hardware and software can be used when desired. Also you have the powerful and very useful Radio Shack BASIC™ and Exatron disk system, you end up with three systems, FLEX™, Exatron™ and the Radio Shack system!!

PRICES

FLEX special general version $150.00
Includes Editor and Assembler

F-mate™ as described above but not including coming utilities
When ordered with FLEX $ 49.95
Without FLEX $ 59.95

*Special Exatron Disk Controller with 32K RAM expansion $299.95
NOTE: This unit required for the above system.

Screen-Clean™ - RFI hash eliminator for the standard Exatron Expansion and disk controller (removes most of the monitor screen hash)
Kit..... $ 19.95
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Single Disk Drive with enclosure - single side, 40 track - double density $329.95

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Single drive cable $ 24.95
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Radio Shack 16K Color Computer, with Extended BASIC and ready for above items $595.00

With the above as a package you have a FULL 48K RAM plus ROM computer with FLEX™ and disk(s) for LESS THAN $1500 and with C O L O R!!!

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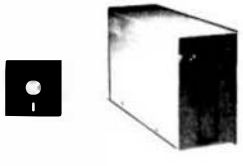

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DATAMAN + combines the capabilities of DATAMAN, DATARAND and DATACALC. It has been redeveloped from the ground up after over 12 months of experience with the DATAMAN system. DATAMAN + is a powerful RANDOM Database Management system under FLEX, UNIFLEX and OS-9.

DATAMAN + is for BUSINESS systems with 56K user ram. You can use DATAMAN + for inventory control, work scheduling, mailing lists, sales reports and much more. The powerful report writer lets you create invoices, statements, form letters, and any other type of report your business needs. You can perform calculations with your data and print out the results. Special printer handling allows use of any size column output, not just 80 and 132.

DATAMAN + is Password protected at the menu level so that redundant password prompts are eliminated. We've added the human touch with the use of the operators name and calculator style input. DATAMAN + checks for valid data types on input thus eliminating erroneous data in your database.

DATAMAN + 's report writer has added intelligence so that separate select programs need not be run to create different reports from the same database. As a matter of fact, the report writer is so flexible that you can use it to create invoices, statements, even form letters using data from the database. You can even perform calculations with the data and put the results in the report.

Setting up your system to run DATAMAN + is very easy and automatic. The entire system has been designed with the inexperienced user in mind. The operation of the system is so easy that although a manual is provided none is required to run DATAMAN + .

It's easy to create databases and reports with DATAMAN + . Full editing capability has been added to make it a snap. DATAMAN + is the first truly RANDOM DBM system to allow any size record and any number of fields.

Modifying DATAMAN + is easy because DATAMAN + comes with every line of source on disk! and an easy to use manual with sections on each program for the programmer who wants to make modifications or customize it.

Dataman+ ONE PROGRAM THAT DOES IT ALL!

An upgrade will be available for users with DATAMAN.
FLEX version available now. $199.95
UniFLEX and OS-9 versions soon thereafter.

THE BILL PAYER SYSTEM™

THE BILL PAYER is a package of 10 menu driven programs in TSC Extended Basic. This powerful system helps you keep track of your bills. You can create a vendor list, enter invoices to be paid, generate reports about them, print your checks and much more. Uses random access files.

Explore Package now included at the same price.
THE PURCHASE ORDER system adds purchase orders to the BILL PAYER. This package of programs adds another level of control to your expenditures. Prints out purchase orders and keeps track of purchases. Requires the Bill Payer to work.

INCOME/EXPENSE LEDGER. This valuable package is most appreciated at tax time. Allows up to 99 income and expense numbers. Ties into the PURCHASE ORDER system, and the Bill Payer.
Includes manual and source supplied on disk in TSC Extended Basic.

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76 XBASIC programs at less than $1 each. Stand alone or used as subroutines in your applications. These 76 programs are converted from the OSBORNE/McGraw-Hill book to TSC XBASIC. They support your printer, are fully tested and debugged. Use the Apple][or Wang version of the book (not included) for documentation. The programs are very well commented with a large number of REMarks for easy use. The source is included on the disk. Supplied on TWO 5 inch or ONE 8 inch disk.
76 programs for only $69.95

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READ TRS-80 LEVEL II BASIC TAPES

This program, with an easy to make interface will read TRS-80 LEVEL II BASIC tapes and convert the programs to TSC BASIC. Those things that can't be converted are flagged so that you can find them easily with the TSC text editor. Now you can use all that TRS-80 software out there. 6809 Assembly language - includes sources on DISK! $54.95
*(instructions and schematic included - cost about $2 to build!

PLOT

Now you can have GRAPHICS added to all your programs. Just write the data out to a virtual array and call PLOT. PLOT is written in TSC XBASIC and the source is included on the disk.
INFINITE RESOLUTION GRAPHICS ON YOUR TERMINAL OR PRINTER. HISTOGRAMS, BARGRAPHS, XY PLOTS PLUS OTHERS.
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Flex User Notes

BY: RONALD W. ANDERSON
3540 STRUBRIDGE COURT
ANN ARBOR, MI 48105

MORE ON PRIME NUMBERS?

Since writing a few columns ago about the Prime number program by Brian Bailey that executes the primes to 10000 in 2 seconds, I've had a couple of other reports and listings appear in my mailbox. Doug Beck sent me a listing of a Sieve method program that finds the primes in 0.51 seconds on a 1 MHz 6809 system. Andrew Wood sent two listings all the way from Australia. The first, he indicates is quite straightforward, and it finds the same primes in 0.256 seconds. The second has been optimized by using single byte arithmetic where the numbers are small enough, etc. It finds the same primes in 0.187 seconds! (These times are all without listing the results of course.) The sieve method requires all the numbers to be in an array in memory, so the results may be printed out after the calculations are done. Andrew indicates that "as a matter of interest, an IBM assembly language version of this same algorithm ran in under 5 milli-seconds on an IBM 3033!" He also indicates that he thinks these times can be bettered somewhat, but not by another factor of 10!

Since receiving the above, I received a letter from Alan Fowler in Australia. He has submitted an article to '68' Micro Journal that will probably be published in this issue (or the last one). He has written a program to find the primes less than 10000 in 146 Milliseconds. Apparently my mention of the 2 second program set quite a few people in motion to try to better that time. Since Mr. Fowler's program will be published with his article, I won't give details here.

All these listings, which I have yet to compare in detail, sort of pushed me into a project I had been thinking about for a while. A long time ago, I did a Sieve prime program in BASIC. (Perhaps back far enough that I didn't really optimize things as much as possible.) Last night, I decided to translate the program to Pascal. I needed an "Integer square root" and it hardly seemed reasonable to have to include the whole floating point and Scientific function packages of the runtime for one line of code, so I wrote a simple Newton's method square root function that returns the nearest integer to the actual square root (or more correctly, one of the two nearest integers). I compiled the program in Pascal, using OmegaSoft and Lucidata. Remember that this method requires all the calculations to be done before we know which numbers in the array are the primes, and the following times are for the calculation part only. Lucidata: 18 seconds, Omegasoft: 3.5 seconds, and TSC Pascal: 2 seconds flat! The Pascal listing is included here.

I have to admit that looking at the programs from Andrew Wood showed me that the array need not be initialized with the odd numbers, but simply with a boolean "flag". When the "crossing out" is completed, one can calculate the numbers from the value of each of the array indices where the contents are "true". I'm not quite certain that this isn't cheating a bit, because the calculation of the numbers from the array indices is really part of the calculation of the prime numbers, yet it is not included in the calculation time, but is part of the "output" time. However, using an array of BOOLEAN, reduces the memory requirement by half, since Boolean values are single bytes. I was able to calculate the primes to a limit of 30,000 by increasing the array dimension to 15,000. The calculation ran 12 seconds with the OmegaSoft compiled code.

The arrival of Alan Fowler's letter made me decide to try the primes in Assembler using the sieve algorithm that I used in the Pascal Program mentioned above. A rather direct translation, using FLEX routines wherever possible, after a bit of study and optimization of the main loop, finds the primes in 176 Milliseconds. My first try ran 241 Milliseconds. After getting the program this far, I looked at Alan Fowler's approach, which is rather similar. I decided that I would have quite a time reducing my time below that 146 Millisecond record, so I have quit for a while. In order to get my time down I used direct page addressing for a few variables. I don't think a program that simply indicates that it has done something, is quite complete unless it can output its results, so I added the routines necessary to scan the array of numbers left by the prime finder, and output the numbers in 10 columns per line. I also added a prime count output. I suppose that I will sometime again pick up the problem and make further improvements, but for the time being, I'm satisfied that the rule that Assembler is about 10 times faster than the best compilers, holds pretty well.

FILES WITH LUCIDATA PASCAL

I've received a few letters from some other Pascal purchasers that don't think the Lucidata Manual is the greatest in a few areas (though the feeling is unanimous that the demonstration programs are very helpful). In particular, the area that describes the use of files suffers from the lack of a specific discussion of how a command line specifies files and indicates how those files are linked to the internal filenames of the Pascal program. This will be an attempt to clarify that information somewhat. I note with some interest that the manual produced for version 2 of the compiler contains considerably more information on this subject than the version 3 manual. The discussion that is in the manual is in section 4.2 in both cases. To expand on the discussion a bit, let's start with BASIC. You may recall with most BASIC interpreters, that you open a file by its "directory" file name, and at that point, you give it a file number by which it is referenced thereafter in the program. Pascal does roughly the same thing, except that it uses names rather than numbers as internal references.

Suppose you write a program in Pascal that is to read a file and perform some operation on it and write the result to a

second file. You might decide that you are going to call the files INDATA and OUTDATA respectively in the program. The Pascal Program's first line would then be: PROGRAM OPERATE (INDATA, OUTDATA); . Actually to be compatible with standard Pascal, you would have to declare two other filenames in the parameter list, those of INPUT, and OUTPUT. Lucidata's compiler always provides these two channels to the terminal, and it doesn't require their presence in the parameter list, but it doesn't object to their being there either. The full line for a standard Pascal implementation would then be: PROGRAM OPERATE (INPUT, OUTPUT, INDATA, OUTDATA); . You will have to declare two variables INDATA, OUTDATA : FILE OF CHAR; Somewhere in the program you would have to open these two files: RESET (INDATA); {OPEN FOR READ} REWRITE (OUTDATA); {OPEN FOR WRITE}

How do we ever get the disk filename involved? When you run the program you associate the disk filenames with the internal filenames in the command line. +++RUN OPERATE DATA.TXT NEWDAT.ATXT. Note that the ORDER of specifying the filenames in the command line determines which is associated with INDATA (the first one) and OUTDATA (the second one). To write to the terminal you use WRITE (VARIABLENAME); To write the contents of that variable to the disk file you would use WRITE (OUTDATA, VARIABLENAME);. Reading data from a file proceeds similarly. The only caution is that if you have a file full of integer numbers, they must be read into an integer variable etc.

Perhaps it will help you to understand files if you realize that INPUT and OUTPUT are files of CHAR. They are the channels to the standard I/O device (the terminal). It is easy to output to a printer too. The printer becomes another file of CHAR open for output only. Lucidata has conveniently linked the FLEX printer drivers to Pascal as device #2. In the program first line, you use PROGRAM TESTPRINT (INPUT, OUTPUT, PRINTER); Of course, PRINTER could be whatever you want to use as an internal filename. Just 'P' would do if you wish. Inside the program you must declare the variable PRINTER : FILE OF CHAR; and open the file for write with REWRITE (PRINTER);. The command line is simply RUN TESTPRINT #2. If you leave out the #2, any output indicated in the program for the printer, will default to the terminal. Of course you output to the printer by WRITE (PRINTER, "HI THERE");. For this to work properly without having used the printer previously, you will have to overlay a location in Pascal (DEVINT, for DEVice INITialize), with the address of the printer initialization routine ($CCC0 for FLEX 9). With this much of a start, the manual should make sense in that area now.

Lucidata has an area in memory set up as a table of addresses of device drivers. DEVTAB is the name they gave this table. Entry #2 has been pre set to be a jump vector to $CCE4 for FLEX9, or $ACE4 for FLEX2 version. You may overlay the other devices in the table with addresses of your assembler generated driver software. You could, for example, set up device #4 to be a modem. Lucidata covers the procedure to get the various devices (usually ports) initialized properly by writing a program (subroutine) in assembler to initialize all the devices you are going to use, and overlaying DEVINT with the address of that routine.

The method described here to link internal and disk filenames is probably the "most standard" for Pascal implementations, but it is not the only way among all the implementations available. The concept of an internal and external filename is quite standard. How they are associated seems to vary a bit. Some Pascals allow the association in the command line only. Others allow prompting for the filename or "building it in" to the program (OmegaSoft in particular), and still others allow either method (TSC).

If I receive a letter or two expressing interest in the pursuit of some of the more obscure features of Pascal, and Lucidata's implementation in particular, I will discuss the topics of SET and POINTER variables in Pascal and the area of interface to assembler routines in some future column.

READER RESPONSES

Generally, when I've asked for responses in the past, I've received no more than three letters. For example, I once mentioned having written a rather complete floating point math package for the 6800, and then having translated it for the 6809. I offered to publish it if any readers were interested. I received two letters expressing interest at the time, and one recently. Since it hardly seems fair to take up a whole month's column with information of interest to three readers, I didn't follow through on that particular offer. The point is that if you really do want to see some continued discussion of the more complex parts of Pascal, send me a card, at least.

6809 ASSEMBLER THOUGHTS

I've had some thoughts about my approach to learning the 6809 instruction set. When I first received my 6809, I translated a few utilities, making use of the Y index register to avoid the continual pointer swapping (STX, LDX) instructions that were required by the 6800 because there was only one index register. I learned how to use the D register and remember being disappointed by the lack of some of the D register instructions such as ADCD, ASLD, CLRD, and related ones. Later, in the process of rewriting my 6800 binary floating point math package, I found that having a user stack eliminated a lot of problems with passing parameters to subroutines. If you use the system stack, there is always a return address in the way on the stack. You can't pull the variables with the 6800 unless you first pull the return address and save it for a later push. With the 6809, you can use the user stack, and you needn't pull the variables to perform the operations on them because you can use the user stack pointer as an index pointer also. LDD 2,U will get the 16 bit parameter two bytes down in the stack, for example.

Having gotten that far, frankly, I didn't ever go back and see what could be done with the register offset indexing

(except once to index into a table of values using X as the pointer to the start of the table, and the value in B just previously calculated, as the offset. The point is that I wonder how many of us are really taking advantage of the power of the 6809. Have you used indirect addressing and the combinations of indirect and indexed modes? I've seen some of these modes appearing in compilers that I have been looking at, so I guess we are getting the benefit of the 6809 anyway when we use some of the better software that is now available for our systems. Perhaps I could take a few paragraphs each time and discuss the application of some of those more interesting instructions to solve some problem in assembler. Have you tried a 16 by 16 bit multiply using the MUL instruction? It is really quite easy to do, and ultra fast.

Have you discovered how nice the user stack is for a "work area"? I have included two listings here that might make the point. Way back, I learned something about assembler programming and using FLEX subroutines by writing a simple program to allow filling a specified area in memory with any specified byte. The listing is included here as FILL. This listing is simply a 6800 version with minimum changes to make it 6809 code, assembled by the 6809 assembler. Somewhere (I think it was a TSC listing) I saw the neat trick of letting the assebmler calculate the size of the program. You will notice that it is $2F or decimal 47 bytes long. The other listing, FILL09 has been written to use the user stack for a work area. PSHU X is a two byte instruction, and it replaces STX FIRST, STX LAST, which are three byte instructions. In addition, all the indexed instructions are two bytes. The designers of the 6809 really gave us a nice tool when they included the ability to "index off of U" as well as push and pull from the user stack. You will notice that this program is $24 or 36 bytes long. If your system startup file were to set the user stack at MEMEND, you wouldn't need that instruction here, and the program would be 34 bytes long, a considerable saving by using the '09 as it was intended.

If you had a program with many variables, keeping track of them as 0,U, 2,U, etc. would be most confusing. Fortunately, there is a simple way to use variable names again. The most straightforward way, in this example is to use an equate to assign a name to 0, 2, 4, etc. I've done that in the program FILL09. Remember that the first variable to get pushed on the stack has the highest offset. By setting FILBYT EQU 5, LAST EQU 2, FIRST EQU 0, you may make the substitutions in the program. (Remember FILBYT is the low order byte of a double byte returned by FLEX GETHEX routine). The only "clutter" is the ",U" that follows the variable names. Actually there is an even "slicker" way to assign the offsets to the variable names, using the SET facility of the TSC Assembler. It would work something like this for FILL.

```
SET SAVE EQU *
ORG 0
LAST RMB 2
FIRST RMB 2
ORG EQU SAVE
```

SAVE is a dummy variable whose purpose it is only to hold the assembler current address counter while the variables are being defined as offset from zero. The SET feature of the assembler may be used to assign SAVE another value elsewhere in the program if more variables are defined. I wish I could take credit for this slick way of assigning variable names on the user stack, while letting the assembler do the work of keeping track of them, but the technique comes from a Monitor source listing supplied by Creative Microsystems with some of their 6809 hardware.

There is another surprising benefit to using the user stack for variables. I was going to go back and look at this utility and make it position independent, but I found that it already is! The only absolute references are to FLEX, and these should be absolute, since FLEX doesn't move when the utility is loaded in a different place. You might not have noticed, but when the stack is used for variables, the importance of direct page addressing fades considerably. The 6809 has the ability to move direct addressing to any page of memory. I wonder how many of us have taken advantage of that?

A few paragraphs up, I asked for reader response concerning more Pascal information. I'll add another question to my poll. Would you like to see more examples of 6809 assembler programming techniques such as this? Perhaps I am a bit simple minded, but I find that I learn faster from a few simple examples than a highly technical description of some nice programming technique. If you like this approach, I will continue it.

```
                    * FORMAT: FILL,BYTE,FIRST ADR.,LAST ADR.
                    *
                    * BYTE IS HEX BYTE DESIRED TO FILL MEMORY
                    * FIRST AND LAST ADDRESSES ARE INCLUSIVE.
                    *
                    * EXAMPLE: FILL,00,0100,01FF
                    *
                    * RESULT: FILL ALL MEMORY FROM $100 TO
                    * $1FF WITH '00'
                    *


                    $SYSTEM EQUATES

               CD03 WARMS   EQU   $CD03
               CD42 GETHEX  EQU   $CD42

C100                        ORG   $C100
                    *
C100 20  01         FILL    BRA   START
C102 01             VN      FCB   1
                    *
C103 BD  CD42       START   JSR   GETHEX
C106 BF  C12B               STX   FIRST
C109 B6  C12C               LDA   FIRST+1
C10C 34  02                 PSHS  A
C10E BD  CD42               JSR   GETHEX
C111 BF  C12B               STX   FIRST
```

```
C114 B0 CD42          JSR   GETHEX
C117 30 01            LEAX  1,X
C119 BF C12D          STX   LAST
C11C 35 02            PULS  A
C11E BE C12B          LDX   FIRST
                      *
C121 A7 80      FLOOP STA   ,X+
C123 BC C12D          CMPX  LAST
C126 26 F9            BNE   FLOOP
C128 7E CD03          JMP   WARMS
                      *
                      * VARIABLES
                      *
C12B            FIRST RMB   2
C12D            LAST  RMB   2
                      *
           002F SIZE  EQU   *-FILL
                END   FILL

0 ERROR(S) DETECTED
```

```
                * FORMAT: FILL,BYTE,FIRST ADR.,LAST ADR.
                *
                * BYTE IS HEX BYTE DESIRED TO FILL MEMORY
                * FIRST AND LAST ADDRESSES ARE INCLUSIVE.
                *
                * EXAMPLE: FILL,00,0100,01FF
                *
                * RESULT: FILL ALL MEMORY FROM $100 TO
                * $1FF WITH '00'
                *


                *SYSTEM EQUATES

           CD03 WARMS EQU   $CD03
           CD42 GETHEX EQU  $CD42
           CC2B MEMEND EQU  $CC2B
           0000 LAST  EQU   0
           0002 FIRST EQU   2

C100                ORG   $C100
                    *
C100 20 01     FILL BRA   START
C102 01        VN   FCB   1          FLEX VERSION NUMBER
                    *
C103 FE CC2B   START LDU   MEMEND     PUT STACK AT MEMEND
C106 B0 CD42        JSR   GETHEX      GET BYTE TO FILL
C109 34 10          PSHS  X           PUSH ON SYSTEM STACK
C10B BD CD42        JSR   GETHEX      GET FIRST FILL LOCATION
C10E 36 10          PSHU  X
C110 BD CD42        JSR   GETHEX      GET LAST FILL LOCATION
C113 36 10          PSHU  X
C115 AE 42          LDX   FIRST,U     STARTING LOCATION
C117 35 06          PULS  D           GET BYTE TO FILL AS LOW ORDER
C119 E7 80     FLOOP STB   ,X+
C11B AC C4          CMPX  LAST,U
C11D 23 FA          BLS   FLOOP
C11F 33 44          LEAU  4,U         REMOVE PARAMETERS FROM STACK
C121 7E CD03        JMP   WARMS
                    *

           0024 SIZE  EQU   *-FILL
                END   FILL

                0 ERROR(S) DETECTED
```

COLOR User Notes

ROBERT L. NAY
4429 Plantation Lane
Norcross, GA 30071

Yep, ANOTHER address. Well, this one is HOME BASE! I've been TDY for several months; now back home again (would you believe how much stuff you can get stuffed into a small, temporary, room?). It's finally moved back; the COLOR COMPUTER is back "on line"; and I'm running late on getting this column in. (Oh yeh, I've also changed jobs in the middle of all of this, too.) It's been a hairy few weeks climaxing an unbelievable ten months; maybe things can get back to normal again. All this is a "round about" apology to all who have written and not received a reply; letters are arriving with three different address changes, which takes a WHILE to catch up with me. Also, I have a dozen or so that I just haven't had a chance to answer. If you don't get an answer, drop me another letter, if you will, and I'll get back with you ASAP.

Meanwhile, back to business. Still not much from Radio Shack on the EDITOR/ASSEMBLER or the SCRIPSIT Wordprocessor; both are still "due" shortly. The Disk Systems haven't started appearing again, either. I look for a lot of Radio Shack Software to start appearing early this spring, and the arrival of the Disk Systems, in quantity, will release a bunch of non-Radio Shack Software also. I know of several excellent Programs that are about ready to go, but release is being held up so they can be made compatible with the RS DOS. I don't think there will be too much problem marrying this COLOR Computer FLEX Operating System to RS DOS, either. If you've been following this Column, you know I am running Steve Odneal's conversion of FLEX on my COLOR COMPUTER, and it's still operating GREAT. We have identified a few "bugs", but nothing that has caused any real problems, and all have been easy to fix without any major revisions to the conversion. All in all, Steve has done an outstanding job.

My personal dream is to get this Computer running a "C Compiler"; from what I can find out about it, I think C will be the Programming Language of the future (all right; ALL RIGHT! I DON'T have FORTH running on it, either - I'd also be interested in that too). As we'll see shortly, we are just beginning to tap some of the potential of this little "machine".

First, let's look at the MC6883 Synchronous Address Multiplexer that eliminates a board full of chips and adds MORE power to the already extremely powerful 6809E CPU chip which is in this Computer. The "SAM", which sure beats "Synchronous Address Multiplexer", has been discussed in several publications, normally in reference to the Video Capabilities of the Color Computer. It DOES add some more "graphics" modes to the Computers' stable, but that is sort of a fallout or overflow of it's real job, that of CONTROLLING the COMPUTER. The CPU does all of the "bit banging", but the SAM is the "system coordinator". It's job is to keep

everybody talking to each other, making sure the RAM gets refreshed (without getting in the way of anything else), allocating and controlling the "screen memory", providing the SYSTEM timing, etc., etc., etc. As you can see, the whole system would break down without it. Normally, the CPU is called the "heart" of a computer, but, in this computer, it is just the "brain" (and we all know that can't be very important, because most of us get along pretty well with very little). The SAM has to be the "heart" of the Color Computer.

Motorola has Data Sheets on the MC6883 SAM now, and an Application Note is in the works. I won't waste valuable magazine space with a copy of the Data Sheet, which is fairly extensive. Also, the following discussion will be kept general; this will provide a look at SOME of the SAM's relatively unknown capabilities. Those interested in further study will find the Data Sheet to be fairly complete, and can use their imagination in utilizing that info. This discussion provides:

1—The non-technical Color Computer readers with an idea of how their machine works;

2—The general SS-50C Buss users with information about a new LSI that is available;

3—Some insight into why some of us are so enthusiastic about the Radio Shack Color Computer;

4—Some thoughts on "possibilities";

5—And provides a look at a fantastic Product available for this Computer from ATOMTRONICS in Los Alamos, N.M.

The MC6883/SN74LS783 (yep, it's a member of the 74LS family) Synchronous Address Multiplexer is just that; it marries the MPU (6809E in the Color Computer), VDG (Color Video Display Generator), and all Memory into an effective, compact Computer SYSTEM. Since it DOES have control of ALL memory, it can accomplish many tasks which would require extensive design and numerous chips to implement without the SAM. If you look at the physical "internals" of the Color Computer, you are immediately struck by the low parts count. The System Block Diagram shown on the MC6883 Data Sheet is the Block Diagram of the Color Computer.

The SAM effectively resides in the $FFC0 to $FFFF Memory area, with the area between $FFE0 to $FFF2 reserved for future expansion by Motorola. They also recommend that the I/O area between $FF60 and $FFC0 be reserved for future expansion of Control Registers and Special I/O applications. Remember, the 6883 controls access to the memory: this means that it expects certain memory locations to contain specific types of access; primarily it expects the I/O (Input/Output) region to be from $FF00 to $FF60. Some may feel this limits design freedom; personally, I think it will prove to be a boon to Computer Designers because we now have sort of a "standard" I/O area specified, and it is high enough in memory to allow a lot of freedom with RAM utilization. Although the 6883 was obviously designed to support the 6809 series chips, it sure is not restricted to use with them only. The SAM's Control Registers are not utilized in the normal method of reading or writing a byte to an address location, but are controlled by the PROCESS of writing TO a SPECIFIC location. The information "written" is meaningless; a write to an EVEN numbered address CLEARS the bit and a write to an ODD numbered address SETS the bit (for example, writing to location $FFDE clears the "Map Type" to zero, while writing to location $FFDF sets the "Map Type" to one). This allows simple loop routines to provide the SAM Control, in most cases.

The "Map Type" referred to above provides one of the more powerful, and as yet little used, functions of the SAM. This is the MEMORY Map Type; Memory Map Type ®#0 (zero), and Memory Map Type ®#1. Memory Map Type ®#0 is used for "ROM Based Systems" (such as the Color Computer), and the Memory Map Type ®#1 is used primarily for "RAM Based Systems". Three Device Select pins are provided; S0, S1, and S2. These can be decoded to allow switching between ROM and RAM in the same address areas (for example, the 16K of BASIC ROM's in the Color Computer at $8000 thru $BFFF can be switched off and RAM activated in this area). The Type ®#0 Memory Map also allows "Page Switching" of the bottom 32K of memory, providing an indirect addressing range of 96K on the Color Computer. This is accomplished by "folding" 64K memory for the two pages, leaving the ROM's in their present position, and adding RAM from $C000 to $FF00 thru the Cartridge Slot. (I have just implemented this setup on my Color Computer, and it WORKS. We'll see how shortly, and look at more details and information next month.) The Map Type ®#1 provides a full 64K RAM (less the $FF00 and up area, which should be reserved for the SAM and I/O). Stick a ROM at the top of memory, say from $F800 up, leaving "holes" for the SAM and I/O, and you have 62K of continuous memory from $0000 up. This is what Mike Wolf of ATOMTRONICS has accomplished with his 64K/WOLFBUG Mod Kit.

QUICK LOOK:
ATOMIC CITY ELECTRONICS (ATOMTRONICS)
3195 Arizona
Los Alamos, N. M. 87544

ATOMTRONICS has several products out for the Color Computer. The most expensive, and the most valuable, is the 64K RAM Kit with the WOLFBUG Monitor in a 2716 ROM. This Kit sells for $349.95, and includes a small EPROM Adapter Board, the Wolfbug ROM, a set of 8 MCM6665 64K RAMs, and a RAM Adapter Board; along with solder, extra wire for some required jumpers, full instructions, etc. This installation requires a few changes inside the Computer, so will void the Radio Shack warranty when installed. Also, even though installation is fairly simple and the instructions complete, I would not recommend you attempt the mod yourself if you do not have a GOOD, isolated, 1/16" tip soldering iron, and are experienced in working with high density Solid State boards. The kit can be installed by an experienced friend, or, normally, by the Dealer from which you purchase the Kit. All of ATOMTRONICS products are available through

SOUND CENTER RADIO SHACK
WHITEROCK SHOPPING CENTER
LOS ALAMOS, N.M. 87544
505-672-9824

They will install the Kit at no charge if you will pay shipping both directions. The actual modification consists of unplugging the RAMs that are in the Computer, installing the RAM Adapter Board, connecting a couple of wires, and installing the RAMs. If you want the Memory Map Type ®#1 (64K RAM - up to $7FFF in this mod, WOLFBUG lives from $F800 up) capability, you also must perform a small mod to the Computer Circuit Board, which requires cutting a few lands and installing some jumpers. The EPROM Adapter Board is installed by unplugging the Color BASIC ROM, plugging the EPROM Adapter Board into the empty socket, installing the BASIC ROM in the provided socket, and hooking up 4 wires. The WOLFBUG Monitor ROM is already installed on the Adapter Board. The instructions cover power-up procedures and a discussion of using the WOLFBUG Monitor Routines thru BASIC to check the system out by displaying two different messages using the Memory Map Type ®#0 two-page capabilities. A discussion of the Monitors' use and a Commented Source Listing is also provided.

The WOLFBUG Monitor contains several "User Accessible Routines" for controlling the Memory Map Type ®/0 and Map Type ®/1 capabilities of the SAM, along with Routines for manipulating the two Map Type ®/0 Pages. These can be called through BASIC "EXEC" or "USR" statements, and through assembly language Interrupt Service Routines. These require that the SWI3 Vector be initialized, but this is also taken care of with WOLFBUG. A Routine is also provided which, when called via a BASIC "EXEC" command, loads BASIC into RAM, goes to the all RAM mode (Memory Map Type ®/1), and restarts BASIC. The WOLFBUG Monitor uses single key commands in providing the following functions:

"A"-ASCII dump of memory

"B"-Enter BASIC

"D"-Route output to display

"F"-Floppy Disk boot

"G"-Go to a machine language program

"H"-HEX dump of memory

"L"-Load and Run, Transfer BASIC to RAM in 64K and run BASIC

"M"-Examine and/or change memory

"P"-Route output to the Printer (600 Baud)

"T"-Memory test routine. Can not test the bottom 1K of memory

"R"-Switch to the all RAM mode (Map Type ®/1), 64K only

"X"-Allows typing of text to the screen

The memory dumps are "paged" with the <ENTER> Key. The cursor is non-destructive and may be called as a USR function from BASIC. WOLFBUG uses the SWI3 as a "breakpoint", providing a register dump when encountered for program debugging. The "L" command provides RAM from $C000 to $F7FF, which is usable for machine language subroutines, etc., when running BASIC. The Monitors' RS232 output routine outputs 8 bits to allow full graphics capabilities on the popular Printers. Additionally, and more important with the Color Computer, it provides the use of the "shift down arrow" as a Control Key, allowing full Printer controls. A "Control Key" is badly needed for the Color Computer, with it's limited Keyboard, and should be a feature of ANY Monitor for this Computer. The WOLFBUG Monitor allows effective use of the SAM's Memory Management capabilities, and, with the 64K Mod, will allow an imaginative programmer to begin to utilize some of the Color Computers' potential.

ATOMTRONICS has a 16K RAM Kit for $35.00 and a 32K RAM Kit for $75.00. Neither of these kits require any soldering; the 16K Kit is the standard "replace the 4K RAMs with 16K RAMs" modification, but the 32K RAM Kit is different from most we have seen. The normal 32K Mod consists of "piggybacking" two 4116 16K RAMs on top of each other, soldering all the IC Leads to the chip under it except the "chip select" pin, which is lifted and routed to the SAM. The difference in the ATOMTRONICS Kit is that they are ALREADY SOLDERED, with the "chip select" pins already tied together, and a 33 ohm isolation resistor connected to them. All that is done to accomplish the Mod is to remove the RAMs already in the Computer and carefully insert the new "RAM stacks" and hook up the resistor. This sure eliminates a lot of work, and a HIGH potential for inducing problems with bad solder joints or solder bridges between the leads. You may save a few dollars by purchasing a couple sets of chips and installing them yourself, but is 20 to 30 dollars worth the trouble and potential for damaging a chip (at the LEAST, with a good possibility of causing much worse damage)?

Another ATOMTRONICS Product I have been using lately, with NO problems, is their "Color Computer to Epson Printer Interface". This little jewel sells for $49.95, and consists of a small Adapter Board which installs in the Serial Interface Board location inside the Epson MX-Series Printers. The Board has a 5 or 6' cable attached to it which plugs into the Serial I/O Connector on the Color Computer. If you have a V1.1 Color BASIC ROM, or use the 8-bit Printer output Program, and run at the Color Computers' normal 600 baud for the Printer, all you have to do to install the mod is cut one PC Land, open the Printer, plug the Board in, fasten it with the two screws provided, plug the cable into the Computer, and have at it. If you have an early Version Computer with a V1.0 ROM, you don't even have to cut the land. It works like a champ, and is extremely simple. I am running it at 2400 baud (that's what my FLEX Printer Driver Routine is set up for) with no problems; in fact, installing this Interface helped me identify a problem with my Epson 8150 2K Buffer Serial Interface. I have been missing a CR on the Printer every once in a while, and getting two lines of text on one line from the Printer. The problem disappeared when I installed the ATOMTRONICS Interface; therefore, the problem is in the 8150. I do miss the 2K Buffer, but I can't say it's worth the price difference. Obviously, from this discussion, you can change the Baud Rate of the ATOMTRONICS Interface: cut a couple of lands and install some jumpers; all explained in the instructions. As I said, the Interface is so simple, I don't expect to ever have a problem with it. It also MAY eliminate a shortcoming of the Epson Serial Interfaces; some of the GRAFTRAX ROM functions are not operational when using the 8150 Serial Interface. I haven't tried them yet with this Interface, but I think they will work with it. The GRAFTRAX ROMs more than double the control capabilities of the MX-80, and having the use of all of them would be nice.

Things to come from ATOMTRONICS include a Color Computer Expansion Bus, Parallel and Serial I/O cards, possibly an EPROM programmer, and, probably by the time you read this, a Floppy Disk Controller. Generally, the Disk Controller is targeted for around $150, and will have features like single/double density, FLEX and Radio Shack DOS compatibility, use 35, 40, or 80 track Drives, plus allow the addition of other I/O devices. It will probably contain 8K of Memory for DOS operation. Sounds good; again, the holdup is the Radio Shack DOS availability.

OK, we have 64K on the Color Computer, and a means to control it. Where to from here? First, let's look at another feature of the MC6883 SAM; the MPU Rate control. In the 6883's present configuration, you can have three types of clock speeds when in the Map Type ®/0 memory mode. Normally, the "system" clock is around 0.9MHz (this is determined by the TV's horizontal sweep frequency). Changing the clock frequency would destroy the Displays horiz. and vert. sync, making it unreadable. But, what if we just changed the speed for certain memory areas, and left it "as is" for the Screen Display memory block. Well, that's what the SAM does. Since it has complete control over all memory, it can allow some memory areas to run at 0.9MHz, and the rest to run at double that, or around 1.8MHz. A "write" to address $FFD7 produces a clock of 1.8MHz for any accesses to memory in the areas between $8000 to $FEFF and between $FF20 and $FFFF. The rest of memory accesses run at 0.9MHz. A "write" to $FFD6 switches the clock back to the standard 0.9MHz rate. (As presently configured, the 6883 will not allow the clock rate switching when in the Map Type ®/1 mode - all RAM.) Therefore, you can run the full system at the normal 0.9MHz rate, in an "address dependent rate", or at 1.8MHz (which is not usable, as previously mentioned, because it would destroy the Display timing).

ATOMTRONICS has provided 64K; where does the other 32K come from to get the 96K I mentioned. The "easy" way is with the EXATRON Color Computer expansion interface which I reviewed a couple of months ago. I have been running mine HARD for several months without a "hitch", and it contains 32K of dynamic memory with it's own refresh circuits. A minor mod to the addressing logic should allow it to be brought "on line" when the SAM is in the Memory Map Type ®#0 mode, where the 64K is being used for page 0 and 1. WOLFBUG already protects the area from $F800 up, so the BASIC ROMs can be "saved" to Disk and the Expansion RAM activated from $8000 up. It will take a little working with, but should be no real problem. Now we can run the normal BASIC Operating System on page 0 and switch over to page 1 for FLEX, for example, allowing it to also have a "bottom" memory operating area. Another item to think about; put a "bit cruncher" program at $8000 and up, say a Sort/Merge, for example, and let the Computer run in the "address dependent rate" mode, so you are running that program at double the normal speed. But, you say, what happens to your Display when you switch pages to run FLEX, or whatever? Put it up out of the way, in the $E000 area, which most SS-50 Systems use for I/O, and therefore is NOT used by the normal SS-50 Operating Systems. Now we have a "clean" 48K ($0000 to $C000) for FLEX, OS-9, etc. Another possibility; BASIC is now in RAM, so rewrite the Keyboard/Display Routines so that the Display Screen Memory normally lives from $E000 to $F800 - that's the 6K needed for full Graphics.

Well, I didn't promise you COMPLETE solutions, just possibilities. I promised "thoughts on possibilities", and these should keep the "grey matter" active for a month or so. With that, I'll leave it with you for this month.

RLN

Eds Note: Please change all occurances of ® to the foreslash. Our printer does not know what a foreslash is, it therefore converts to the 'registered' symbol.

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Please note that in the monthly column 'BIT BUCKET' appears, for the year, hundreds of small and not so small articles of special interest to most 68XX users. Most of these would comprise a full article in some magazines, but because they came to us as letters, etc., with listing we decided to place all the hints and kinks, fixes, suggestions on improving hardware and software and other valuable subjects in this one grouping. By appearing in BIT BUCKET in no way demeans an article or it's value. In fact, most all readers feel that some of the most valuable information published, appeared in BIT BUCKET.

COMPUWORLD P/R

Jim Walker
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I would like to preface my comments on Compuworld's UniFLEX Version Payroll program by saying that I am not exactly a computer enthusiast. I enjoy using our computer as a multi- faceted time-saving tool. My position requires me to be knowledgeable in many of its uses, including payroll. I have worked with several payroll programs in the past year as our computer was being expanded to better serve our needs. I have entered and reentered data for hours trying to accomplish a task I could do manually in the same time with less effort. This gives me a deep appreciation of a well organized payroll program.

Compuworld's UniFLEX Payroll program was put on our computer just as we were going into a new fiscal year which allowed us to start up with a clean slate.

This program is very impressive in several areas. The manual that accompanies the program is well written (82 pages with 3 detailed appendix's of examples) and geared towards people like me. It provides several pages of basic data that would insult the intelligence of anyone having any computer education. I am trained in the Social Sciences so it is most reassuring to have available. This manual also leads you by the hand through the startup procedure until you actually have the diskettes initialized and the master menu on the screen. Once at the master menu with the manual at ready, you are set for a journey that turns out to be very smooth with only one notable exception.

The Employee Maintenance section allows you all the functions required for exceptionally good records including adding, deleting, or updating employee records. The Auto Insert mode of entering a new employee is very fast and efficient with easy error correction capabilities. The main bug for me here was that upon completion of entering in of employee data, and your satisfied that all data is correct, you must type in "U" to update the information out to the main files. Several times I accidentally hit a CR before entering the "U" and lost all the data for that employee. I suppose that dealing with valuable info such as payroll data, every precaution should be taken to protect against the mistake of writing BAD data though. Deleting employees at year end is very easy and quick also. To update an employee's information is simple and fast but also requires you to select a "U"pdate option upon completion.

This program allows you to get a list of employees and their number but does not provide for a hard copy of the data stored on each employee. While not needed often, this can be useful in assessing for promotions, etc.

The major gripe I have against this program is that we did not receive the updated version of the tax tables and had to spend 12 manhours entering this data. I am sure this problem is resolved and truly hope that Compuworld provides updated tax tables promptly when they fluctuate again under the administrations planned tax cuts. I will admit that much of the time we spent was entering tables for unused figures such as weekly wages from $1.00 to $15.00 which is more time consuming than larger wages. Other payroll systems we have used worked by percentages only, and during that Murphy's Law situation of the computer down on the Friday afternoon that had several changes in the normal payday, it is imposible to hand figure checks and them match the computer later which is a big problem. Thanks to the table system compuworld uses the checks will match!!! The tables are entered a page at a time and pages are incremented so that a special function incorporated can allow only one colum to be entered and it will automaticaly "S"lide the data to all other colums making the task much easier. Compuworld has gone all out in providing various pay variations, such as shift, weekend, and overtime differentials. It also provides for many deductions including union dues, credit union, insurance, and garnishment.

Once all the basic data has been entered and checked and you have familiarized yourself with the program, you will anticipate the ease with which payroll can be run. We have 16 people on payroll divided equally between hourly and salaried workers with 3 part timers thrown in for good measure. This program does not differentiate between hourly and salaried employees, instead it treats everyone as hourly. It uses a 3 decimal accuracy to allow for exact calculation of salaried employees.

To run payroll I use the Autmatic Time-Card Entry selection. With my records for my actual hourly employees at hand, I begin and in less than 20 minutes I

am finished with this part. The prompts that appear make it easy to skip an employee.

This program is nice in that it allows you to AUTOMATICALLY REVIEW one or all of the time cards you have entered to double check yourself thus preventing wasting time printing bad data. This normally takes less than 15 seconds per employee.

If new information comes to light concerning an employee before you have posted the current payroll data to the appropriate file, you can easily update an individual time card and recompute before posting. After all time cards have been entered and checked you go back to the Master Menu and select option #5 (Calculate Employees Paycheck).

When working through the Calculate Paycheck section you need to begin with option #1 which is calculate employee paychecks. You then can review any or all paychecks prior to printing and posting. This gives you one more opportunity to review the data to make sure it is correct. I do not use computer produced checks with our small payroll instead I proceed directly to option #6 which is Post Current Calculated Checks. Next I select option #7-Print Payroll Register which gives me in a clear and concise form all the data required to write checks along with a hard copy for permanent records. This feature has a defect that is present in all the print check printouts which are that it does not print out the employee name, instead you get employee number, check number, social security number, gross wages, various deductions, and net amount. Using a hardcopy of our Employee List mentioned earlier, I am able to write checks. The program includes a complete check writing routine that allows alignment of checks and prints complete information on each check.

The entire process to this point takes only 10 to 15 minutes. Upon completion I go directly to the Master Menu and select option #9- Backup Payroll Diskette. This selection guides the inexperienced through the vital task of making backup records, with a series of prompts and directions that make it understandable to the novice. Upon finishing this task which requires ten minutes, you have completed a normal payroll. You can now take a pen and your Payroll Register and write checks.

For those of you with more employees do not fear because this program is set up to handle 500 employees on a single diskette.

Compuworld has also given us various other functions which could make you into a more efficient manager. The Master Payroll Report Generation Program (option #7 at Master Menu) provides five reports including:

1) Report of Regular Earnings and Hours worked
2) Report of Check Totals for Period Ending
3) Report of Weekly Earnings up to $DDD.CC
4) Report of Wages Taxable under FICA (form 941A)
5) Report of Unemployment Gross Pay for All Quarters up to $DDD.CC

All of these reports will save your accountants time and effort thus producing a savings in fees. When end of year comes round after having used this for the entire year, I will be in high cotton because with Compuworlds Program here I can end out the year and start backup in an hour, or less.

All in all , let me say this program gets my hearty approval. It is well organized so that you have many chances to catch and correct errors. The program and the manual, when used together, are self explanetory in most cases. It has helped me make more efficient use of my time by drastically reducing the amount of time required to take care of paying our employees while maintaining superlative records.

Lastly let me say that Mr. Fred Calev "the main man" at compuworld was only a phone call away for us, and in the very begining what little help we needed, he was very much avaible with quick consise answers to our questions. With a 1 year warrenty and the promptness which updates are shipped out I would end by saying it would be hard to find a better payroll package anywhere.

SIMULATION, GAMES, AND RANDOM VARIABLES

by
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final

A PASCAL program for computing the autocorrelation function of a sequence for k values between one and twenty is shown in Listing 8. The random number generator to be tested is implemented in procedure RANDOM.

A random number generator algorithm which passes the Chi-squared and autocorrelation tests is not necessarily "good" in an absolute sense, since other tests may detect certain non-random characteristics not visible to these tests. A perfectly random sequence would have successive numbers uniformly distributed, triplets of numbers uniformly distributed, and so forth. Some of the more powerful tests actually evaluate these characteristics. The Chi-squared and autocorrelation tests do, however, provide an evaluation of the two most basic characteristic requirements of a random number generator -- uniform distribution and low serial correlation.

There are some general principles to be observed when selecting values of A and C in a linear congruential sequence to be used in random integer generation. Following these principles does not guarantee a good generator, but one can have a fair amount of confidence in its efficacy if it also passes the Chi-squared and autocorrelation tests. These guiding principles are as follows:

1) The modulus M should be large, and selected in accordance with concepts discussed previously. Modular arithmetic must be done precisely, with no roundoff error.

2) The multiplier A should be selected in accordance with the concepts discussed previously. In addition, A should be larger than M, preferably

larger than M/100, but smaller than $A-\sqrt{A}$. The digits in the binary or decimal representation of A should not have a simple or regular pattern.

3) The additive parameter C should be an odd integer and, if M is a power of 10, should not be a multiple of 5. It should be chosen to satisfy the relationship

C/M approximately equal 0.211

4) Since the least significant digits of the integers produced by the sequence may not be very random, use should be influenced primarily by the most siginficiant digits.

For confidence in the generator in extensive or sensitive uses, further tests should be applied. (See Reference 1.)

While all examples of random integer generators presented here are implemented in a high level language, the most efficient implementation occurs at the assembler level where the modular features of register arithmetic can be exploited. For example, the quantity B=A mod M can be determined by a single divide operation by using the remainder rather than the quotient as the answer. In the PASCAL implementation, this must be achieved by the instructions

```
Q:=A DIV M;

B:=A-Q*M;
```

or by use of the MOD instruction. Modular multiplication in assembler code can be accomplished using the full word size of the register (or the "effective register size" if one is working in multiple precision), since the multiplication of n-bit numbers produces a 2n-bit product, of which the low order n-bits constitute the product modulo 2^n. There are also clever ways to produce products modulo $2^n \pm 1$ when using an n-bit word size. Most of the advantages of working in assembler code are in the reduced execution time of the number generator. This can be quite significant in a simulation environment where calls to the random number generator constitute a significant portion of the total execution time.

For simulation purposes, random numbers produced from a uniform distribution on the interval (0,1) are very useful for determining the outcome of a random experiment of some kind. Often, it is desired to produce a random variable with a distribution other than uniform, such as the exponential or normal (Gaussian or "bell-shaped") distributions. Fortunately, random variables with virtually any distribution can be produced from a sequence of uniformly distributed random numbers. For example, a normal distribution can be produced by utilizing the principles embodied in the Central Limit Theorem of statistics, which states that the sum of independent random variables tends towards a normal distribution. That is, the distribution of the random variable Z defined as

$$Z = ((RN_1+RN_2+\ldots+RN_K) - K/2)/(K/12)$$

tends towards a normal distribution with zero mean and variance equal to one as K grows large. For K=12, the computation simplifies to

$$Z = (RN_1+RN_2+\ldots+RN_{12}) - 6,$$

a form found in many standard generators. Any arbitrary mean μ and variance σ^2 can be obtained by the further transformation

$$X = \sigma Z + \mu$$

A PASCAL program for generating normally distributed random variables utilizing these concepts is shown in Listing 9.

Listing 10 presents a PASCAL program for generating exponentially distributed random variables; making use of the fact that, if RN is a random variable uniformly distributed on the interval (0,1), then

$$X = (-1/\mu)\ \ln Rn$$

where lnRn is the natural logarithm of RN, is a random variable exponentially distributed with parameter μ.

There are methods of producing random variables of virtually any desired distribution by use of a sequence of random numbers uniformly distributed on the interval (0,1). This result follows from the fact that, if F(x) is the Cumulative Distribution Function describing the desired distribution, and if RN is a random variable uniformly distributed on the interval (0,1), then solution for X of

the equation

$$F(X) = RN$$

yields a random variable X with the desired distribution. The solution for X may be analytically obtained, as in the case of the exponential distribution above, or it may be obtained by table lookup when analytical methods fail. The fact that such distributions can be obtained make simulation a viable and effective tool.

As a final example, simulation will be used to solve a problem which cannot be solved in any other manner, although the model is much simpler than any real-world situation would produce. Suppose there is a small pond containing 10,000,000 cu. ft. of water, and this pond is fed by a stream whose flow is 40,000 cu. ft. per day. A second stream drains the pond at such a rate to keep the water level constant. Suppose further that it has been proposed to dump wastewater containing ten percent pollutants by volume into the pond. Since the pond is constantly flushed by the stream flow, the pollutant level in the pond will rise to a constant level determined by the rate at which the wastewater flows into the pond. This level could be easily determined by the relationship pollutant flow in = pollutant flow out,

which exists after the pollutant flow has risen to its constant value, if it were not for the rainfall which occurs in the area of the pond. Since rainfall is a random phenomenom, there is no way to describe its effect other than by stating probabilities. Suppose that rainfall histories have produced the following data. The probability of rain on any given day is 0.45, and the amount of runoff entering the pond directly or by way of the stream flow, if rain does occur on any given day, is a random variable whose distribution is approximated by an exponential distribution with parameter 1/30,000. Now it is not possible to determine the behavior of the pollution level because it can only be described in probabilistic terms. What can be done is to simulate the system and generate enough data so that statistical methods can be used.

The simulation equation, determined with one day as the basic time unit, is

$$P_n = P_{n-1} + 0.1W - (40{,}000 + W + R)P_{n-1}/10{,}000{,}000$$

where P_n is the volume of pollutants on day n, W is the wastewater flow per day, and R_n is the volume of rainfall flowing into the pond on day n. This is merely a computation of the change in the volume of pollutants from day n-1 to day n. The rainfall volume R_n is determined in the following way.

1) Generate a random number RN.

2) If RN > 0.45, set R_n=0 and terminate.

3) Generate R_n as a random variable from an exponential distribution with parameter 1/30,000 and terminate.

In this manner, each day is simulated to determine if rainfall occurs, and if it does, the amount is determined. This leads to a day-by-day tabulation of the pollution level in the pond, starting with day one. When this is obtained, it represents only a single result out of an infinite set of possible results. To obtain more information, additional simulation runs must be made, starting with different random integer seeds, and these results then averaged to obtain estimates of the probabilistic characteristics of the real-world system. If it were desired to determine, for example, the number of days before the pollution reached a given level, the varying answers produced by the different simulation runs would be averaged to produce a quantity which would be considered to be the mean of the random variable which is the time to reach that level. This interpretation is necessary because the system itself is random, and statements relating to definite values cannot be made.

If only long term behavior is of interest, the system may be simulated for a long time interval and the data produced during the initial "start-up transient" ignored. For this simulation, the start-up transient period is about 200 days.

A simulation of this system, written in PASCAL, is shown in Listing 11. The wastewater flow rate W is entered as an input, so that the sensitivity of the

results to this parameter can be studied.

While the simulation problem just considered is a simple one, it is representative of many ecological simulations used frequently by environmentalists. This simulation could be progressively modified to make it more realistic by accounting for factors not considered in the model above. Each modification would be relatively simple but would contribute to the overall credibility of the simulation. Soon a complex model would result, but the individual concepts involved in making that model are no more difficult to understand than what has been done here.

There are a myriad of other applications where random simulation models are effectively used. War-gaming, hurricane storm surge and wave action predictions, evaluation of computer operating system procedures, optimal control system analysis, population dynamics, and urban dynamics, among others, come to mind. And, of course, there are the ever popular computer games where the results of play action is determined in accordance with certain probability rules. In this respect, such games are similar to war-gaming simulations used to evaluate tactics, strategy, or weapon system concepts, or to train military leaders under simulated battle conditions.

References

1. Knuth, D.E., The Art of Computer Programming: Volume 2, Semi-numerical Algorithms, Addison-Wesley, 1969.

2. Elbert, T.F. and Enzian, R., "Trapdoor Function Encryption with the 6800," 68' Micro Journal, July 1980.


```
page 1      LISTING 1 *** RANDOM INTEGER GENERATOR ***

PROGRAM RANDTEST;
VAR A,I,C,M,N,X: INTEGER;
BEGIN
   WRITELN('PROGRAM TO GENERATE A SEQUENCE OF PSEUDO-RANDOM INTEGERS');
   WRITELN;
   WRITELN('ENTER NUMBER OF INTEGERS DESIRED');
   READLN(N);
   WRITELN('SEQUENCE IS X(N) =(A*X(N-1) + C) MOD M');
   WRITELN;
   WRITELN('ENTER THE MODULUS M, MAX = 100');
   READLN(M);
   WRITELN('ENTER VALUE OF A');
   READLN(A);
   WRITELN('ENTER VALUE OF C');
   READLN(C);
   WRITELN('ENTER SEED VALUE X(0), MUST BE < M');
   READ(X);
   I :=1;
   WHILE N>0 DO
      BEGIN
         X :=(A*X+C) MOD M;
         WRITE(X:7);
         IF I=10 THEN
            BEGIN
               WRITELN;
               I :=0
            END;
         I :=I+1;
         N :=N-1
      END
END.
```

```
page 1      LISTING 2 *** EUCLID'S ALGORITHM FOR FINDING GCD ***

PROGRAM EUCLID;
VAR
   A,B,B1,R: INTEGER;
BEGIN
   WRITELN ('PROGRAM TO FIND GREATEST COMMON DENOMINATOR GCD(A,B)');
   WRITELN;
   WRITELN ('ENTER VALUE OF B < 102');
   READLN (B1);
   WRITELN;
   WRITELN ('ENTER A VALUES < 102 IN SUCCESSION');
   WRITELN ('ENTER ZERO TO TERMINATE');
   WRITELN;
   READLN (A);
   WHILE A<>0 DO
      BEGIN
         WHILE A<>0 DO
            BEGIN
               B :=B1;
               R :=B DIV A;
               R :=B-R*A;
               B :=A;
               A :=R;
            END;
         WRITELN ('                    ',B);
         WRITELN ('-----------------------------------------');
         READLN (A)
      END
END.
```

```
page 1      LISTING 3 *** MODULAR EXPONENTIAL PROGRAM ***

PROGRAM EXP;
VAR  A,AMOD,B,B1,PROD,M,R: INTEGER;
     AGAIN: CHAR;

BEGIN
   WRITELN ('PROGRAM FOR CALCULATING (A EXP B) MOD M');

   AGAIN :='Y';
   WRITELN ('ENTER M, THE MODULUS < 181');
   READLN (M);
   WHILE AGAIN='Y' DO
      BEGIN
         WRITELN;
         WRITELN ('-----------------------------------');
         WRITELN ('ENTER EXPONENT B < 182');
         READLN (B);
         WRITELN ('ENTER MANTISSA A < 182');
         READLN (A);
         PROD :=1;
         AMOD :=A;
         WHILE B>0 DO
            BEGIN
               B1 :=B;
               B :=B DIV 2;
               IF (2*B)<>B1 THEN
                  BEGIN
                     PROD :=PROD*AMOD;
                     R :=PROD DIV M;
                     PROD :=PROD-M*R
                  END;
               AMOD :=AMOD*AMOD;
               R :=AMOD DIV M;
               AMOD :=AMOD-R*M
            END;
         WRITELN;
         WRITELN ('THE MODULAR EXPONENTIAL VALUE IS ',PROD);
         WRITELN;
         WRITELN ('DO YOU DESIRE ANOTHER CALCULATION?');
         READLN (AGAIN)
      END
END.
```

```
page 1      LISTING 4 *** RANDOM NUMBER GENERATOR ***

PROGRAM RANDTEST;
VAR A,I,C,N,X: INTEGER;
    TEMP: FILE OF CHAR;
BEGIN
   REWRITE(TEMP,'OUTPUT.TEXT');
   WRITELN('PROGRAM TO GENERATE A SEQUENCE OF PSEUDO-RANDOM INTEGERS');
   WRITELN;
   WRITELN('ENTER NUMBER OF INTEGERS DESIRED');
   READLN(N);
   WRITELN('SEQUENCE IS X(N) =(A*X(N-1) + C) MOD 32678');
   WRITELN;
   WRITELN('ENTER VALUE OF A');
   READLN(A);
   WRITELN('ENTER VALUE OF C');
   READLN(C);
   WRITELN('ENTER SEED VALUE X(0)');
   READ(X);
   I :=1;
   WHILE N>0 DO
      BEGIN
         X :=A*X;
         IF X<0 THEN
            X :=X+32767+1;
         X :=X+C;
         IF X<0 THEN
            X :=X+32767+1;
         WRITE(TEMP,X:7);
         IF I=10 THEN
            BEGIN
               WRITELN(TEMP);
               I :=0
            END;
         I :=I+1;
         N :=N-1
      END;
CLOSE(TEMP,LOCK)
END.
```

page 1 LISTING 5 *** SIMULATION OF GAMBLERS RUIN PROBLEM ***

```
PROGRAM GAMBLER;
CONST
   NORM=32767.0;
VAR
   I,II,K,M,N,N1,X: INTEGER;
   AVM,P,PROB,RN,WON,LOST: REAL;
FUNCTION RANDOM(X: INTEGER): INTEGER;
{GENERATES RANDOM INTEGER}
   BEGIN
      X:=181*X;
      IF X<0 THEN
         X:=X+32767+1;
      RANDOM:=X
   END;
BEGIN
   WRITELN('A PROGRAM TO SIMULATE THE GAMBLERS RUIN PROBLEM');
   WRITELN;
   WRITELN('ENTER INDIVIDUAL GAME WIN PROBABILITY');
   READLN(P);
   WRITELN;
   WRITELN('ENTER ODD INTEGER RANDOM NUMBER SEED < 32767');
   READLN(X);
   WRITELN;
   WRITELN('ENTER BEGINNING RESOURCES <32767');
   READLN(II);
   WRITELN;
   WRITELN('ENTER STOPPING RESOURCES < 32767');
   READLN(N1);
   WRITELN;
   WRITELN('ENTER NUMBER OF SIMULATIONS DESIRED');
   READLN(N);
   WRITELN('-------------------------------------------------------------');
   WON:=0;
   LOST:=0;
   AVM:=0;
   FOR M:=1 TO N DO
      BEGIN
         M:=0;
         I:=II;
         WHILE(I>0) AND (I<N1) DO
            BEGIN
               X:=RANDOM(X);
               RN:=X/NORM;
               IF RN<P THEN
                  I:=I+1
               ELSE
                  I:=I-1;
               M:=M+1
            END;
         IF I=0 THEN
            BEGIN
               WRITELN('GAME LOST IN ',M:5,' PLAYS');
               LOST:=LOST+1
            END
         ELSE
            BEGIN
               WRITELN('GAME  WON IN ',M:5,' PLAYS');
               WON:=WON+1
            END;
         AVM:=((M-1)*AVM+M)/M
      END;
   PROB:=WON/(WON+LOST);
   WRITELN('-------------------------------------------------------------');
   WRITELN;
   WRITELN('THE WIN PROBABILITY BASED ON ',N1,' PLAYS IS ',PROB);
   WRITELN;
   WRITELN('THE AVERAGE NUMBER OF PLAYS WAS ',AVM)
END.
```

page 2 LISTING 5 *** SIMULATION OF GAMBLERS RUIN PROBLEM ***

```
               WON:=WON+1
            END;
         AVM:=((M-1)*AVM+M)/N
      END;
   PROB:=WON/(WON+LOST);
   WRITELN('-------------------------------------------------------------');
   WRITELN;
   WRITELN('THE WIN PROBABILITY BASED ON ',N1,' PLAYS IS ',PROB);
   WRITELN;
   WRITELN('THE AVERAGE NUMBER OF PLAYS WAS ',AVM)
END.
```

page 1 LISTING 6 *** SIMULATION OF WAGERING SYSTEM ***

```
PROGRAM SYSTEM;
CONST
   NORM=32767.0;
VAR
   BET,I,II,K,M,N,N1,X: INTEGER;
   AVM,P,PROB,RN,WON,LOST: REAL;
FUNCTION RANDOM(X: INTEGER): INTEGER;
{GENERATES RANDOM INTEGER}
   BEGIN
      X:=181*X;
      IF X<0 THEN
         X:=X+32767+1;
      RANDOM:=X
   END;
BEGIN
   WRITELN('A PROGRAM TO SIMULATE WAGERING SYSTEM');
   WRITELN;
   WRITELN('ENTER INDIVIDUAL GAME WIN PROBABILITY');
   READLN(P);
   WRITELN;
   WRITELN('ENTER ODD INTEGER RANDOM NUMBER SEED < 32767');
   READLN(X);
   WRITELN;
   WRITELN('ENTER BEGINNING RESOURCES <32767');
   READLN(II);
   WRITELN;
   WRITELN('ENTER STOPPING RESOURCES < 32767');
   READLN(N1);
   WRITELN;
   WRITELN('ENTER NUMBER OF SIMULATIONS DESIRED');
   READLN(N);
   WRITELN('-------------------------------------------------------------');
   WON:=0;
   LOST:=0;
   AVM:=0;
   FOR M:=1 TO N DO
      BEGIN
         M:=0;
         I:=II;
         BET:=1;
         WHILE(I>0) AND (I<N1) DO
            BEGIN
               X:=RANDOM(X);
               RN:=X/NORM;
               IF RN<P THEN
                  BEGIN
                     I:=I+BET;
                     BET:=1
                  END
               ELSE
                  BEGIN
                     I:=I-BET;
                     BET:=BET+BET;
                     IF BET>I THEN
                        BET:=I
                  END;
               M:=M+1
            END;
         IF I=0 THEN
            BEGIN
               WRITELN('GAME LOST IN ',M:5,' PLAYS');
               LOST:=LOST+1
            END
         ELSE
            BEGIN
               WRITELN('GAME  WON IN ',M:5,' PLAYS');
               WON:=WON+1
            END;
         AVM:=((M-1)*AVM+M)/N
      END;
   PROB:=WON/(WON+LOST);
   WRITELN('-------------------------------------------------------------');
   WRITELN;
   WRITELN('THE WIN PROBABILITY BASED ON ',N1,' PLAYS IS ',PROB);
   WRITELN;
   WRITELN('THE AVERAGE NUMBER OF PLAYS WAS ',AVM)
END.
```

page 1 LISTING 7 *** CHI-SQUARED TEST ***

```
PROGRAM CHISQUARE;
CONST
   B1=39.2; B2=49.3; B3=65.5; B4=112.2; B5=129.1; B6=191.9;
VAR
   I,J,N,N1,K,INT,DINT: INTEGER;
   COUNT: ARRAY[1..64] OF INTEGER;
   EX,RN,S,T,DT: REAL;
PROCEDURE RANDOM(VAR X: INTEGER; VAR RN: REAL);
   BEGIN
      X:=181*X;
      IF X<0 THEN
         X:=X+32767+1;
      RN:=X/32768.0;
   END;
PROCEDURE TEST(B: REAL);
CONST
   B1=32.6; B2=39.9; B3=52.2; B4=73.6; B5=91; B6=106.6;
BEGIN
WRITELN;
IF (B<B3) OR (B>B6) THEN
   IF (B<B2) OR (B>B5) THEN
      IF (B<B1) OR (B>B6) THEN
         WRITELN('TEST FAILS AT 99% CONFIDENCE LEVEL  REJECT')
      ELSE
         WRITELN('TEST FAILS AT 95% CONFIDENCE LEVEL  SUSPECT')
   ELSE
      WRITELN('T ST FAILS AT 75% CONFIDENCE LEVEL')
ELSE
   WRITELN(' EST DOES NOT FAIL AT 75% CONFIDENCE LEVEL  GOOD TEST');
END;
BEGIN
   WRITELN('PROGRAM TO APPLY CHI-SQUARED TEST TO THE RANDOM NUMBER');
   WRITELN('GENERATOR IMPLEMENTED IN PROCEDURE RANDOM');
   WRITELN;
   WRITELN('ENTER QUANTITY OF RANDOM NUMBERS TO BE USED  SHOULD BE > 300');
   READLN(N1);
   WRITELN;
   WRITELN('ENTER RANDOM NUMBER  SEED');
   READLN(X);
   WRITELN('-------------------------------------------------------------');
   FOR I:=1 TO 64 DO
      COUNT[I]:=0;
   T:=0.01;
   RANDOM(X,RN);
   FOR N:=1 TO N1 DO
      BEGIN
         INT:=1;
         T:=0.0;
         DT:=0.25;
         DINT:=32;
         FOR I:=1 TO 6 DO
            BEGIN
               IF RN>T THEN
                  BEGIN
                     T:=T+DT;
                     INT:=INT+DINT
                  END
```

page 2 LISTING 7 *** CHI-SQUARED TEST ***

```
               ELSE
                  T:=T-DT;
               DT:=DT/2;
               DINT:=DINT DIV 2
            END;
         COUNT[INT]:=COUNT[INT]+1;
         RANDOM(X,RN)
      END;
   WRITELN('THE HISTOGRAM DATA');
   WRITELN('-------------------------------------------------------------');
   WRITELN;
   FOR I:=1 TO 64 DO
      BEGIN
         IF I MOD 8=0 THEN
            BEGIN
               WRITELN;
               FOR J:=7 TO 1 DO
                  WRITE(COUNT[J]:6)
            END
      END;
   WRITELN;
   WRITELN('-------------------------------------------------------------');
   EX:=N1/64;
   S:=0;
   FOR I:=1 TO 64 DO
      S:=S+SQR(COUNT[I]-EX)/EX;
   WRITELN;
   WRITELN('THE TEST STATISTIC IS ',S);
   TEST(S)
END.
```

```
Page 1      LISTING 8 *** AUTOCORRELATION TEST ***

PROGRAM AUTOCOR;
TYPE
   VECTOR=ARRAY[1..20] OF REAL;
VAR
   I,N,N1,K:INTEGER;
   AV,LO,HI,RN,VA:REAL;
   V,R:VECTOR;
PROCEDURE RANDOM(VAR X:INTEGER;VAR RN:REAL);
{CONTAINS THE RANDOM NUMBER GENERATOR TO BE TESTED}
   BEGIN
      X:=(181*X);
      IF X<0 THEN
         X:=X+32767+1;
      RN:=X/32767.0
   END;
PROCEDURE TABLE(VAR R:VECTOR);
VAR
   I:INTEGER;
   BEGIN
      WRITELN;
      WRITELN('THE AUTOCORRELATION FUNCTION IS ');
      WRITELN;
      WRITELN('          K              R(K)          K              R(K)');
      WRITELN;
      FOR I:=1 TO 10 DO
         WRITELN(I:10,'          ',R[I]:(I+10):10,'          ',R[I+10]:10);
      WRITELN('                                                              ');
   END;
BEGIN
   WRITELN('PROGRAM TO DETERMINE SERIAL CORRELATION OF THE RANDOM');
   WRITELN('NUMBER GENERATOR IMPLEMENTED IN PROCEDURE RANDOM');
   WRITELN;
   WRITELN('ENTER QUANTITY OF RANDOM NUMBERS TO BE USED  SHOULD BE > 100');
   READLN(N1);
   WRITELN;
   WRITELN('ENTER RANDOM NUMBER SEED');
   READLN(X);
   WRITELN('                                                              ');
   AV:=0;
   VA:=0;
   FOR N:=1 TO 20 DO
      BEGIN
         RANDOM(X,RN);
         V[N]:=RN;
         AV:=((N-1)*AV+V[N])/N;
         VA:=((N-1)*VA+SQR(V[N]))/N
      END;
   FOR N:=1 TO 20 DO
      R[N]:=0.0;
   FOR N:=21 TO N1 DO
      BEGIN
         RANDOM(X,RN);
         FOR I:=1 TO 20 DO
            R[I]:=((N-21)*R[I]+RN*V[I])/(N-20);
         FOR I:=1 TO 19 DO
            V[I]:=V[I+1];
         V[20]:=RN;
          AV:=((N-1)*AV+RN)/N;
          VA:=((N-1)*VA+SQR(RN))/N;
      END;
   VA:=VA-SQR(AV);
   FOR I:=1 TO 20 DO
      R[I]:=(R[I]-SQR(AV))/VA;
   TABLE(R);
   WRITELN;
   WRITELN('MEAN = ',AV);
   WRITELN('VARIANCE = ',VA);
   LO:=(-1-2*SQRT(N1*(N1-3)/(N1-1)))/(N1-1);
   HI:=-LO-2/(N1-1);
   WRITELN;
   WRITELN('THE 95% CONFIDENCE CORRELATION LIMITS ARE ',LO,' TO ',HI);
END.
```

```
Page 1      LISTING 9 *** GENERATION OF NORMAL RANDOM VARIABLES ***

PROGRAM NORMRAND;
VAR  I,J,N,N1,X:INTEGER;
     MU,SIGMA,RN,Y:REAL;
     TEMP:ARRAY[1..5] OF REAL;
PROCEDURE RANDOM(VAR X:INTEGER;VAR RN:REAL);
{GENERATES RANDOM NUMBERS}
BEGIN
   X:=(181*X);
   IF X<0 THEN
      X:=X+32767+1;
   RN:=X/32767.0
END;
PROCEDURE NORMAL(MU,SIGMA:REAL;VAR X:INTEGER;VAR Y,RN:REAL);
{GENERATES GAUSSIAN VARIABLE FROM 12 RANDOM NUMBERS}
VAR
   I:INTEGER;
   BEGIN
      Y:=0;
      FOR I:=1 TO 12 DO
         BEGIN
            RANDOM(X,RN);
            Y:=Y+RN
         END;
      Y:=(Y-6)*SIGMA+MU
   END;
BEGIN
WRITELN('PROGRAM TO GENERATE SEQUENCE OF RANDOM VARIABLES');
WRITELN('         WITH MEAN = MU, VARIANCE = SIGMA**2');
WRITELN;
WRITELN('ENTER MEAN (RETURN), VARIANCE, (RETURN)');
READLN(MU);
READLN(SIGMA);
WRITELN;
WRITELN('ENTER RANDOM SEED INTEGER');
READLN(X);
WRITELN;
WRITELN('ENTER QUANTITY OF NUMBERS DESIRED (MULTIPLE OF 5)');
READLN(N1);
WRITELN('o - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - o');
   I:=1;
   FOR N:=1 TO N1 DO
      BEGIN
         NORMAL(MU,SIGMA,X,Y,RN);
         TEMP[I]:=Y;
         IF I=5 THEN
            BEGIN
               WRITELN;
               FOR J:=1 TO 5 DO
                  WRITE(TEMP[J]:13);
               I:=1
            END
         ELSE
            I:=I+1
      END;
   WRITELN;
   WRITELN('o - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - o');
END.
```

```
Page 1      LISTING 11 *** POND SIMULATION ***

PROGRAM PONDSIM;
VAR  I,N,N1,N2,N3,X:INTEGER;
     AV,P,R,RN,VA,W:REAL;
PROCEDURE RANDOM(VAR X:INTEGER;VAR RN:REAL);
BEGIN
   X:=(181*X);
   IF X<0 THEN
      X:=X+32767+1;
   RN:=X/32767.0
END;
FUNCTION RANDEX(MU:REAL):REAL;
BEGIN
   RANDOM(X,RN);
   RANDEX:=-LN(RN)/MU
END;
BEGIN
   WRITELN('THIS PROGRAM SIMULATES THE POLLUTION LEVEL IN THE');
   WRITELN('     POND FOR SELECTED WASTEWATER FLOW RATES');
   WRITELN;
   WRITELN('ENTER WASTEWATER FLOW RATE IN CU. FT. PER DAY');
   READLN(W);
   WRITELN;
   WRITELN('ENTER NUMBER OF DAYS TO BE SIMULATED');
   READLN(N1);
   WRITELN;
   WRITELN('ENTER DAY ON WHICH TO START AVERAGING');
   READLN(N2);
   WRITELN;
   WRITELN('ENTER ODD RANDOM INTEGER SEED');
   READLN(X);
   WRITELN('--------------------------------------------------');
   P:=0; AV:=0; VA:=0;
   WRITELN;
   WRITELN('      DAY      % POLLUTION LEVEL');
   WRITELN;
   I:=0;
   FOR N:=1 TO N1 DO
      BEGIN
         RANDOM(X,RN);
         IF RN>0.48 THEN
            R:=0
         ELSE
            R:=RANDEX(3.333E-5);
         P:=P+(.08*W-(40000.0+W*R))*P)*1E-7;
         WRITELN(N:8,P*100:8);
         IF N>N2 THEN
            BEGIN
               I:=I+1;
               AV:=((I-1)*AV+P)/I;
               VA:=((I-1)*VA+SQR(P))/I
            END
      END;
   WRITELN('--------------------------------------------------');
   WRITELN;
   WRITELN('DAY AVERAGE LEVEL=',AV,'  WITH VARIANCE =',VA)
END.
```

```
Page 1      LISTING 10 *** GENERATION OF EXP DIST RANDOM VARIABLES ***

PROGRAM EXPRAND;
VAR
   I,J,N,N1,X:INTEGER;
   MU,RN:REAL;
   TEMP:ARRAY[1..5] OF REAL;
PROCEDURE RANDOM(VAR X:INTEGER;VAR RN:REAL);
{GENERATES RANDOM NUMBERS}
BEGIN
   X:=(181*X);
   IF X<0 THEN
      X:=X+32767+1;
   RN:=X/32767.0
END;
FUNCTION RANDEX(MU:REAL):REAL;
{GENERATES EXPONENTIALLY DISTRIBUTED RANDOM VARIABLE FROM RANDOM NUMBER}
BEGIN
   RANDOM(X,RN);
   RANDEX:=-LN(RN)/MU
END;
BEGIN
   WRITELN('PROGRAM TO GENERATE SEQUENCE OF EXPONENTIALLY DISTRIBUTED');
   WRITELN('RANDOM VARIABLES WITH PARAMETER MU');
   WRITELN;
   WRITELN('ENTER PARAMETER MU');
   READLN(MU);
   WRITELN;
   WRITELN('ENTER RANDOM SEED INTEGER');
   READLN(X);
   WRITELN;
   WRITELN('ENTER QUANTITY OF NUMBERS DESIRED (MULTIPLE OF 5)');
   READLN(N1);
   WRITELN('-------------------------------------------------');
   I:=1;
   FOR N:=1 TO N1 DO
      BEGIN
         TEMP[I]:=RANDEX(MU);
         IF I=5 THEN
            BEGIN
               WRITELN;
               FOR J:=1 TO 5 DO
                  WRITE(TEMP[J]:13);
               I:=1
            END
         ELSE
            I:=I+1
      END;
   WRITELN;
   WRITELN('-------------------------------------------------');
END.
```

FLEX & CC

FLEX™ on the COLOR COMPUTER!!

For a long time now we, users of the 68XX series of devices have longed for a less expensive way of using the power of the 6809 and the excellent FLEX™ disk operating system from Technical System Consultants, as opposed to starting out with an initial large (couple thousand bucks or more) investment. Also some delight in and justify the initial cost of a computer because it can do other things than just ledgers, journals, and limited graphics applications. I know of literally hundreds of users of other computer systems who really wanted a better system but had to have something that mommy and the kids could derive some benefit from. We lost out! This applies mostly to the hobbyist portion of our group. The serious and business (a fast growing part) user of course is willing to spend the larger amount initially, for that insures them of starting off with the 'full bore' top of the line system. For the hobbyist the first consideration, in most cases, is the start-up cost. Once the system is used and appreciated then they will (as has happened with other systems) go on to bigger and better things. Then we all gain for we have not lost them to some other cheaper (!) system.

The standard hardware that is now available (Standard S50 Bus) is the finest but the cost does keep some from ever finding out really how good we have it with the Standard S50 Bus and the FLEX™ disk system or OS-9™. The availability of some other small and less expensive (to start) computers has hurt us. They have sold the hardware and software and we lost a fellow 68XX user! By the time, if ever, that the person who bought something else finds out about all the shortcomings and lack of utility of his or her xbrand computer, it is too late, the nest egg is spent and they are 'stuck' (in more ways than one) with what they have bought. They loose and we loose, the only ones who won are the other fellows! It is a fact, the more users of a particular system, the more choice of hardware and software becoming available for that particular brand of computer, regardless of it's quality or price. It is simply a matter of making available merchandise to sell to the LARGEST group; the more users the more bucks to be garnered. And the more profit any advertiser can show the more time and effort he will spend to develop better products. Nothing hinders the availability of products as much as a lack of sufficient profit!

One of the divisions of Computer Publishing, Inc. (CPI) is Data-Comp/SE Media, who sell hardware and software worldwide. It is the policy of CPI not to allow Data-Comp or SE Media to advertise any item that is advertised by one of our regular advertisers. The logic is simple, we have an obligation to the advertiser who spends his money with us, not to compete with him and you the readers are not shortchanged for the product is still advertised and available. This is more fair than a lot of other computer magazines I know of.

Because of a desire to entice more beginners to start up with the 6809 I have authorized Data-Comp and SE MEdia to license the Steve Odneal drivers and other utility patches for FLEX™ and FLEX™ related software. Also they will be offering a special verison of several disk controller boards including the Radio Shack controller (locally modified) or software patches to allow FLEX™ and hopefully OS-9™ later, to run on the color computer. At the present the system is running on the Exatron expansion and controller board, with some RFI (hopefully being corrected). This brings a 16K color computer up to 48K of RAM and the ability of using FLEX™ or the original system, be it RS or Exatron. As of this date we have most all normal FLEX™ software running and more is becoming available very soon.

The system or software can be purchased from Data-Comp in bits and pieces. Say you already have a 4K CC then all you would need is the 16K expansion, the controller with RAM expansion, our patches and modifications and FLEX™; NOTE: here is one very important aspect of this entire matter, FLEX™ is a copyrighted product and we INSIST that this FLEX™ be purchased from an authorized source!!! I know there is always the temptation to 'borrow' a copy from a friend BUT this in some cases will not work and also it HURTS us all, more so than you might believe, for TSC has spent literally thousands of dollars in bringing us FLEX™ and we hurt us all if we 'cop' a copy. Data-Comp will be selling an 'authorized' FLEX™ will all the patches available, at a very reasonable price, so really there is no valid need to 'steal a little' and bum or borrow a copy from some unauthorized source. It may seem a small thing, but it could hurt us all!!!

Data Comp will make available the FLEX™ with patches and mods as necessary, the Memory Expansion kits, disk controller boards, patches and mods to other 6809 software and even the Color Computer for those who do not already have a color computer.

A complete modified Color Computer with 48K RAM, single disk drive (double density type), controller board with modifications done for about $1595.00. Yep, a computer system with disk for less than $1600.00. THIS WE HAVE NEEDED FOR A LONG TIME! The system can use up to 4 drives, so storage will be no problem. Also coming will be double sided double density systems for those who really want to go hog-wild. Actually by that time I suspect that the color system will take back seat to a more complete Standard S50 Bus system.

Watch 68 Micro Journal for additional information and reread some of Bob Nay's Color Computer User Notes for additional info about this system.

DMW - - -

A to D

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16-CHANNEL A TO D CONVERTER

Question: How do you get a 16-channel A/D converter that is accurate, easier to use, faster, and still less expensive than the popular commercial model? Answer: Build it yourself! It may be easier than you think.

Unlike some other A/D converters, the 40-pin DAS-952R, available from Datel Intersil, does all of it's conversion in hardware. This simplifies the software to the point of being trivial. To use the converter from BASIC program, for example, only two lines of code are needed. In addition, since I did not use a PIA or other programmable type interface chip, hardware initialization is not necessary.

The Chip

The DAS-952R is described as a monolithic CMOS 16-channel, 8-bit data acquisition system. High accuracy and excellent repeatability are claimed which I can vouch for. After using SWTP's joystick interface, I was amazed by the stability of the DAS-952R. The converter uses a chopper-stabilizer circuit which minimizes thermal effects and long-term drift. The conversion is done with a 256R ladder to ensure monotonicity. This chip is a ratiometric converter, meaning the output value is expressed as a percentage of the input reference voltage. As long as variable

resistance inputs are used (joysticks, pots), a precision voltage reference source is not required in the circuit. The chip has latched address inputs, tri-state outputs, and uses less than ma of supply current.

The Circuit

To interface the DAS-952R to the SS-50 bus, only two chips are required. Taking advantage of the motherboard decoding, I built the circuit on a 30-pin I/O card using only a single 74138 decoder and a 8098 (figure). Since so much room was left on the card, I added one additional chip, a 74240, for an 8-bit input port (figure 2). To this I connected eight toggle switches for use as sense switches.

The circuit for the A/D converter is shown in figure. The analog signals are connected to the 16-channel input pins, CH1 - CH16. I used variable resistors and connected the wipers to the channel input pins. One side of each resistor is connected to +5 volts from the voltage regulator, and the other side is connected to ground.

The four inputs, CA1 - CA4, select which channel of the 16 is to be converted. I connected these inputs directly to the data bus. The 74138 decoder is wired to send a write pulse to the AE (channel address enable) input to latch the channel number. The same pulse initiates the conversion process by strobing the SOC (start of conversion) input. This simplifies programming: to select a particular channel, the computer simply writes the channel number into the first address of the I/D port.

When the A/D chip completes its conversion, the EOC (end of conversion) output goes high. I connected this output through a tri-state inverting buffer to bit seven of the data bus. The 74138 decoder enables this bit so a read operation of the first port address will return the status of the conversion.

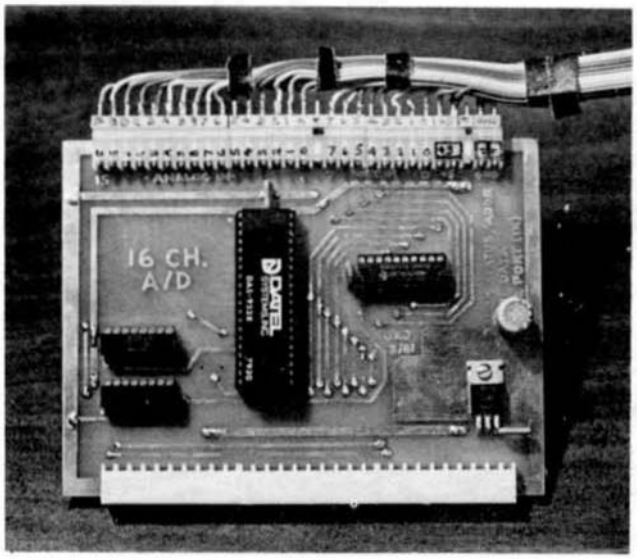
When bit seven goes low, the conversion is complete and the output of the desired A/D channel is ready for the data bus. A read operation on the second address of the port is decoded by the 74138 which sets the OE (output enable) pin high and returns the 8-bit converted data.

The +5 voltage is supplied by a 5-volt regulator (not shown). The +5 supply is tied to the positive reference pin (V+ ref) and to one side of each variable resistor. The negative reference pin (V- ref) and the other side of each variable resistor are connected to ground. Pin EC (expansion control) must be pulled high for the channel multiplexer to work. The output of the channel multiplexer (MUX out) is connected directly to the input of the converter (A/D in).

The .0033 microfarad capacitor sandwiched between two inverters deserves some comment. When I first built the circuit, I used a breadboard strip to test and debug the design. After I was satisfied that it worked, I etched a printed circuit board and made a plug-in card for my computer. To my surprise, the PC card version would not select the channels reliably although the breadboard worked perfectly! A little detective work revealed the AE (address enable) input has to be delayed 50 nanoseconds after the channel address lines (CA1 - CA4) have stable data. The capacitance in the breadboard layout must have delayed the signal enough. For the PC card, the capacitor delays the pulse about 60 ns while the inverters buffer and condition the pulse. I will be the first to admit I am no hardware expert; and although this works, there may be a better solution.

The Card

I used a double-sided PC board for this



project, with molex connectors mounted along the top edge to allow connection to the 16 pots. I included eight additional connection points for the eight sense switches. The entire circuit fits very nicely on a 4" by 5.5" card (photo) with room to spare.

If PC card construction is not your idea of a good time, wire wrap or even point to point wiring should be easy on a circuit this simple. Since only one tri-state inverter was needed out of six in the 8098, I used the first four as simple inverters, grounding their common enable (pin). If you build this circuit, don't forget power and ground to each chip. The DAS-952R is a CMOS chip, so be sure to take the proper precautions to prevent damage by static electricity.

Test the circuit by connecting several potentiometers between +5 and ground. Connect the wipers to CH1 and other inputs. Using the short BASIC routine given below, try reading the channel inputs. The value from the converter should vary from 0 to 255. Unconnected channels will float, returning unpredictable values.

If you have a problem, use an oscilloscope to determine that the proper signals are getting through the 74138 decoder. Pin5 should go momentarily low when a write is made to the first address of the port. Pins1 and 10 should show low pulses when the converter reads the first and second addresses, respectively, of the port. By the way, I used a 74138 decoder rather than a 74LS138. I had problems with the 74LS138 when breadboarding the circuit, but never tried one with the final PC version.

One final point, if your system clock is faster than 1.2 MHz, you may have to supply a separate clock or add a flip-flop to divide the system clock by two.

The Software

As mentioned earlier, the software required to use this A/D converter is simple. In BASIC, only two lines of code are required:

```
100 POKE P,C
110 D = PEEK( P + )
```

The variable P is the address of the port into which you have plugged your card. The variable C is the channel (1 through 16) that you desire to read. The variable D will contain the 8-bit data from the selected channel.

A program to read all 16 channels for test purposes might look like this:

```
10 REM : DEFINE PORT ADDRESS
15 P = HEX("E070")
20 REM : READ EACH CHANNEL
25 FOR C = TO 16
30  POKE P,C
35  PRINT PEEK( P + )
40 NEXT C
```

Now, what could be simpler!

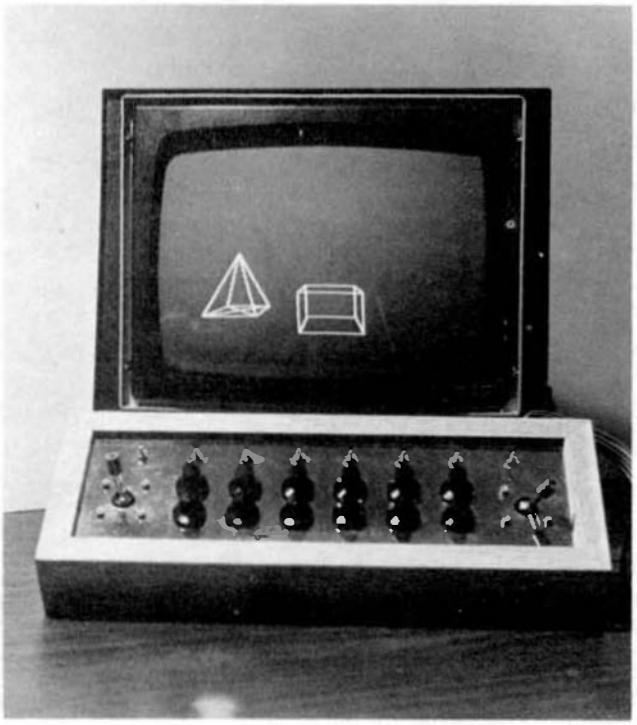
If you need to work in assembly language, the code required is nearly as simple. The only additional requirements are a short delay and a test for the end of conversion. For example, using extended addressing and the 6809 processor:

```
* ENTER WITH THE DESIRED CHANNEL
*  NUMBER IN THE B-REG.
* EXIT WITH THE CONVERTED DATA
*  IN THE A-REG.


GETAD  STB  PORT
     LBRN *     DELAY
     LBRN *
GETAD2 LDA  PORT   GET STATUS
     BMI  GETAD2 WAIT FOR EOC
     LDA  PORT+1 READ DATA
```

The STB at the label GETAD selects the channel and starts the conversion. The two LBRN's are more than enough delay to allow EOC (bit 7) to go high. The loop at GETAD2 waits until EOC returns low, signaling the end of conversion. The final LDA reads the converted data.

With assembly language,0000 to 12000 conversions can be made each second!



What Now ?

What do you connect 16 channels to? Any combination of joysticks, rotary pots, or slide pots are easily connected. The value of the resistor is not critical. I have tried everything from 500 ohm to-MEG pots and nearly anything works. With higher resistances, however, noise is more likely to be a problem. With-MEG pots, I had trouble when the wires from the pot were routed near a video monitor. On the other hand, if the resistance is too low, you might draw too much current (remember, each resistor is connected directly between +5 and ground). You should have no trouble with anything between 500 ohms and0K ohms.

I built this circuit primarily to control a 3-0 graphics program. I needed to control seven parameters giving the position and orientation of the viewer within a three dimensional data base. I made a control box (photo 2) with two joysticks, twelve pots, and eight toggle switches. Each of the parameters are controlled by one or two pots, depending on the precision desired. Any parameter may be switched by software control to either axis of either joystick. The toggle switches are connected to the 8-bit input port on the A/D card. If a switch is up, the associated control is interpreted as proportional data. If a switch is down, my program turns that control into an integrating A/D input. The flexibility provided by the 16 channels of input allows me to travel at will through the 3D data base using the video screen as a window.

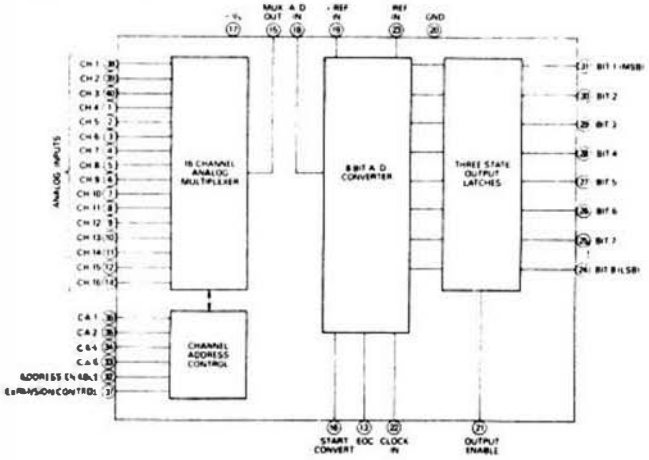
Incidentally, I am using an S-100 bus ALT-512 high resolution graphics board as my video graphics output. This card packs a lot of features, including two-page operation for flicker-free animation. I built a piggy-back interface card to use the ALT-512 on the SS-50 bus.

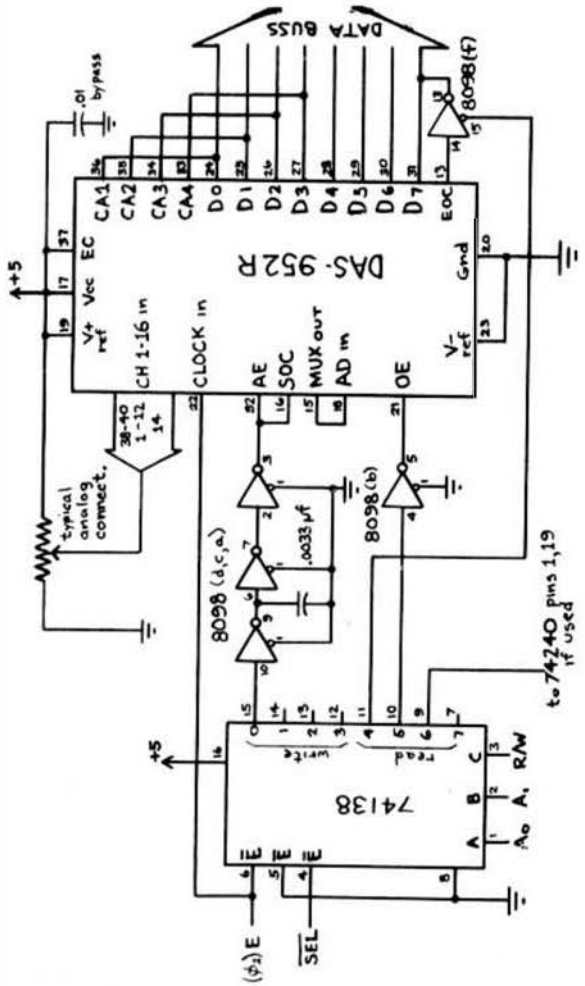
The heart of the 3D program is a subroutine from SUBLOGIC that does the 3D to 2D transformation. A 6809 version is not available, so I disassembled the 6800 program, did some optimization for speed, and reassembled it for the 6809 processor. Deciphering the program was not trivial - If you desire to do the same, drop me a line and I might be able to save you some time.

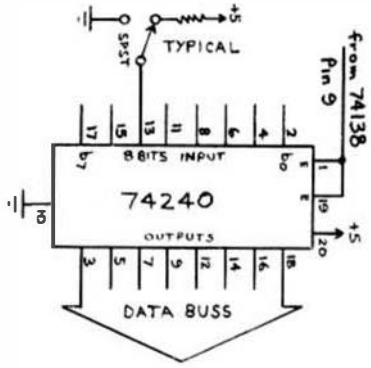
In Conclusion

I feel that the time and effort I put into this project was well spent. If you have a use for analog input to your computer, consider building this circuit. I don't think you will be disappointed.

The DAS-952R is available from DATEL INTERSIL, INC.,1 Cabot Boulevard, Mansfield, MA 02048 / phone: (617) 339-9341. Price is $29.50 for quantity to 24. The National Semiconductor ADC0816 / ADC0817 appears from the data sheet to be pin compatible with the DAS-952R.







B+Tree Index

B+-TREE INDEXING AND ACCESS SYSTEM

The B+-Tree Indexing and Access system allows the user to create, maintain, and use indexes to a file of records. The system is written in TSC's version of Pascal for the UniFLEX operating system. The system is provided by MetaMicro Library Systems, Inc. of San Antonio. The user should be familiar with the UniFLEX operating system, the programming language Pascal, and TSC's implementation of Pascal for UniFLEX.

So, what is the B+-Tree Indexing and Access System? If you use data files with a large number of records, it could be a great help. The system provides the user a method to index and access the main record number and up to 101 keys per record for each record in a data file. For example, in testing the system programs a file which varies in record size from 925 to 950 was used. Each record consists of a student name, i.d. number, various kinds of personal information, and the classes each student attends during the school year. The Indexing and Access System programs are used to insert, delete, and retrieve the record numbers and certain information (the keys) for each record. In this manner the data file itself does not need to be manipulated to retrieve data. The Indexing and Access System programs are run to look up desired information. If need be, the record of the data file can be accessed directly by use of the UniFLEX procedure 'seek.'

The b+-tree holds the index when the index itself is too large to fit in main memory. MetaMicro states that storage utilization is no worse than 50 percent; any key in an index containing 1,000,000 keys can be found in only four disk accesses. The "+" in b+-tree means that once any key is found, the next key can be retrieved in at most one disk access; in 27 out of 28 times no additional disk access is necessary.

Now you're asking yourself, what do I get with MetaMicro's Indexing and Access System? The system consists of eight programs on an 8 inch single sided, single density disk.

binit	creates an empty b+-tree file.
binsert	inserts keys into a b+-tree.
bdelete	deletes kays from a b+-tree.
bfindx	searches for keys specified exactly.
bgetx	retrieves record numbers marked by the key found by bfindx.
bfind	searches for keys that begin with a specified character sequence.
bget	retrieves record numbers found by bfind.
brdkeys	reads keys from a b+-tree.

The programs are written in TSC's Pascal and compiled into executable files. There are no source listings for the programs.

The program 'binit' is an operating system executable command to initialize the b+-tree. The other seven programs cannot be run directly, but must be run from a user written Pascal program using the procedure 'run.' The seven programs are compiled under the "standard environment" of TSC's Pascal compiler. Also provided are seven additional programs which are the same seven programs compiled in the "system environment."

In addition, provided on the disk, there are source code listings for five programs written in Pascal with the p-extension. These five programs are sample programs which run the programs of the Indexing and Access System. They were especially helpful in testing the system programs. It must be mentioned that even though these sample programs were provided as an aid to the user, one of the programs was not complete because of a disk CRC error. Although the error was simple to correct, it was an inconvenience.

The user's manual is well-written. There seems to be a sufficient amount of information concerning the b+-tree structure to aid the user, and still not confuse him with unnecessary detail. Those desiring additional information are referred to four well-known references on data structures.

Each of the seven programs comprising the Indexing and Access System are described in a manner that seems to be most helpful to the programmer who will write the programs which run the indexing and access system programs. That is precisely the function of this user's manual: a guide to the programmer who is writing the programs to implement the system.

The programs in the system seem to run quite successfully. Using several test runs, there were no problems with the Indexing and Access System programs. The programs seem to be efficient and fast. The sample programs were converted somewhat to test the system programs. Although these sample programs served their purpose as provided, there are several refinements which should be incorporated to make them more usable: make the input either interactive or file based, better checks on possible input errors, better format on the screen output.

There was no price quoted to the reviewer; therefore, it is difficult to estimate some sort of usefulness factor for the prospective user. However, if the potential user uses TSC's Pascal in his UniFLEX operating system and uses large data files, MetaMicro's Indexing and Access System is worth considering.

DISCUSS.CMD

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Canada.

DISCUSS.CMD

This program is an adaptation of John Champlain's DISKSAVE in the August '68'MICRO, but I almost completely rewrote it to take advantage of the 6809 instructions, and also to add a couple of features I thought would be useful.

The main function of the program remains the same, to allow the user access to a disk without going through the directory (especially if the directory has been damaged, which happens to me fairly often), and to copy a sector or block of sectors to another disk. I changed the names for some of the commands I found confusing: B (backup) becomes L (last sector), C (change) becomes W (reWrite), S (save) becomes C (copy), D (display commands) becomes M (menu), and M (monitor) is changed to F (FLEX).

SO THE NEW LIST OF COMMANDS READS:

R- Read sectors
N- Next sector
L- Last sector
S- Skim through file
T- Table of sectors
W- reWrite data
C- Copy to other disk
A- Another file
F- Return to FLEX
M- Menu of commands

More serious is a change to the whole format of the "change (rewrite) data" section, which I put in a form very similar to that of the S-BUG "M" function. I also added to it the possibility of inputting the new data either in hex or in ASCII format (44 and 'D mean the same, as in the Assembler), and to go back one byte. The ASCII format input I added to allow small

corrections to a text file without having to go through the Editor (at the condition that the change made fits into the same space on disk), or (mostly in my case) to change the strings in machine language programs and functions without having to disassemble and reassemble the whole thing. I have used it to translate into French and Spanish the messages in FLEX and the utilities and disk commands.

I also made some changes in the display on screen, partly to clean it up, and partly because I don't have a SWTP terminal, and my control codes are different. But since I gave those codes labels right at the start of the programm, you can change them back easily to what suits your system, or your aesthetic sensibilities.

The two added features are the S (skim through file) command, and the A (another file) command. The first starts from the present sector, and builds a file sector map without showing each sector, and without requiring you to type N,N,N,N... ad infinitum. On a 50 or 100 sector file, it's pretty useful. The second "remembers" the last sector of the last file you read or copied, and starts looking for another file right at the next sector. Good for going through a bombed disk searching for various important pieces of data or programs.

This is one of my first efforts in assembly language, and I would like comments, corrections and suggestions. In particular, about the way my look-up table for commands is set up and stepped through using the indexed JMP instruction, and about the way I eliminate the return addresses on the stack with a LEAS 2,S in the error-catching subroutines. Is there any danger of getting lost doing that? It seems to work fine. I hope this program will be as useful to others, in its new form, as DISKSAVE has been to me. With a big thanks to John Champlain,

Yves LECLERC

Note: The sometimes strange labels are abbreviations from the French in which I first wrote the program. And by the way, if anybody out there is French or Spanish speaking and uses SWTP or other 6809 SS50 stuff, and is interested in exchanges in a language other than English (I have French versions of FLEX and XBASIC working, and Spanish ones in the works), I wish they would get in touch with me.

```
DISCUSS.CMD                          02-1-81 TSC ASSEMBLER  PAGE    1

                    * DISCUSS (Slot 0)

                    * ADAPTED FOR THE 6809 FROM DISKSAVE
                    * BY JOHN CHAMPLAIN
                    * 68 MICRO 8/81

                    * Yves Leclerc 11/29/81

                    * FLEX ROUTINES

            CD3C    OUTHEX  EQU     $CD3C
            CD42    GETHEX  EQU     $CD42
            CD27    NXTCHR  EQU     $CD27
            CD24    PCRLF   EQU     $CD24
            CD18    PUTCHR  EQU     $CD18
            CD03    WARMS   EQU     $CD03
            CD1E    PSTRNG  EQU     $CD1E
            CD15    GETCHR  EQU     $CD15
            CD1B    INBUFF  EQU     $CD1B
            CD39    OUTDEC  EQU     $CD39
            CD      GETFIL  EQU     $CD2D
            CD33    SETEXT  EQU     $CD33
            D406    FMS     EQU     $D406
            CB40    PCBOUT  EQU     $CB40
            0520    FCBIN   EQU     $0520
            053E    PIST    EQU     FCBIN+30        Sector hard address
            0523    DISO1   EQU     FCBIN+3         Disk slot 0
            C080    LINBUF  EQU     $C080           Input buffer address
            0020    SPAC    EQU     $20             ASCII for <space>
            000D    CRET    EQU     $0D             ASCII for <carriage return>
            000A    LNFEED  EQU     $0A             ASCII for <line feed>
            000C    CLSCR   EQU     $0C             ASCII for <clear screen>

                    * VARIABLES

0100                        ORG     $100

0100                TABLE   RMB     $300            Table of sectors
0400                POTBL   RMB     2               Pointer to table
0402                LIGN    RMB     1               Print pointers
0403                LIGN2   RMB     1
0404                TEMP    RMB     2               Utilities
0406                TEMP1   RMB     2
0408                TEMP2   RMB     2
040A                DKFLG   RMB     1
040B                DPIST   RMB     2               Last sector address
040D                LONG    RMB     2               Length of present file

                    * TABLE OF COMMANDS

040F 52             COMND   FCC     "R"
0410 C2FA                   FDB     RDSECT

0412 43                     FCC     "C"
0413 C1Bo                   FDB     COPFIL
0415 53                     FCC     "S"
0416 C3C2                   FDB     SKFIL
0418 57                     FCC     "W"
0419 C244                   FDB     REWRT
041B 4E                     FCC     "N"
041C C140                   FDB     NXTSCT
041E 41                     FCC     "A"
041F C364                   FDB     ANOTHF
0421 54                     FCC     "T"
0422 C1BB                   FDB     SHOTAB
0424 4C                     FCC     "L"
0425 C16B                   FDB     PRECE
0427 4D                     FCC     "M"
0428 C124                   FDB     REDEB
042A 46                     FCC     "F"
042B CD03           FINCMD  FDB     WARMS

0100                        ORG     $0100           Beginning of program

0100 20  01         PREM    BRA     DEBUT           False start
0102 03             VN      FCB     3               Version

                    * PREPARATION

0103 7F  040A       DEBUT   CLR     DKFLG           Initialize flag
0106 7F  0100               CLR     TABLE           and table
0109 7F  0101               CLR     TABLE+1
010C BE  0100               LDX     #TABLE          Note address of table
010F BF  0400               STX     POTBL
0112 BD  CD27               JSR     NXTCHR          Which disk?
0115 24  02                 BCC     UNITE
0117 86  30                 LDA     #'0             A Default: 0
0119 80  30         UNITE   SUBA    #$30            From ASCII to hex
011B 81  01                 CMPA    #1
011D 25  02                 BLS     CAVA
011F 86  01                 LDA     #1              Default: 1
0121 B7  0523       CAVA    STA     DISO1

                    * GENERAL MENU

0124 8E  C414       REMEN   LDX     #MSG1           Point to message
0127 BD  CD1E               JSR     PSTRNG          and display

012A BD  CD15       CLAV    JSR     GETCHR          Take a command
012D 8E  040F               LDX     #COMND          Point to list
0130 A1  80         LKCMD   CMPA    0,X+            Look for a match
0132 27  0A                 BEQ     OKCMD           Yes, next step
0134 30  02                 LEAX    2,X             No, look on
0136 8C  042B               CMPX    #FINCMD         End of list?
0139 25  F9                 BCS     LKCMD           No, continue
013B 7E  CD03               JMP     WARMS           Yes, exit
013E 6E  94         OKCMD   JMP     [0,X]           Jump to routine
```

```
C140 17  00E3    NXTSCT  LBSR    FLGV
C143 FC  053E            LDD     PIST        Present sector
C146 F3  0400            ADDD    #1          Becomes last
C149 BE  0520            LDX     #FCBIN      Goto FCB
C14C AC  08 20           CMPX    32,X        Length of file
C14F 27  0403            BEQ     LONG
C152 EC  08 40           LDD     64,X        Next sector
C155 C1  00              CMPB    #0          All done?
C157 27  06              BEQ     FINI
C159 F3  053E            STD     PIST        Yes, new address
C15C 7E  C312            JMP     AJTABL      Show sector
C15F 8E  C622    FINI    LDX     #MSG6       Go for next command
C162 BD  CD1E            JSR     PSTRNG
C165 16  00B5            LBRA    INST

                 * LAST SECTOR

C168 17  0080    PREVE   LBSR    FLGV
C168 BE  0400            LDX     POTBL       Refer to table
C16E 30  1E              LEAX    -2,X        Go back one step
C170 8C  0100            CMPX    #TABLE      Start of table?
C173 27  0D              BEQ     PASOP       Yes, jump out
C175 30  1E              LEAX    -2,X        No, go back one more
C177 EC  84              LDD     0,X
C179 FD  053E            STD     PIST
C17C BF  0400            STX     POTBL
C17F 7E  C312            JMP     AJTABL      Display sector
C182 8E  04F1    PASOP   LDX     #ERR2
C185 BD  CD1E            JSR     PSTRNG
C188 16  0092            LBRA    INST        Go for next command

                 * FILE MAP

C18B 17  0048    EMOTAB  LBSR    FLGV
C18E 8E  C654            LDX     #MSG7       Table heading
C191 BD  CD1E            JSR     PSTRNG
C194 8E  0100            LDX     #TABLE      Top of table
C197 C6  0A      COMPT   LDB     #10         Define format
C199 BD  CD24            JSR     PCRLF
C19C BD  C39D    DIR     JSR     IMPHEX      Print addresses
C19F 30  01              LEAX    1,X
C1A1 BD  C39D            JSR     IMPHEX
C1A4 30  01              LEAX    1,X
C1A6 8C  0400            CMPX    POTBL       Finished?
C1A9 27  72              BEQ     INST        Yes, go for next command
C1AB 5A                  DECB                No, next line
C1AC 27  E9              BEQ     COMPT
C1AE 8D  C3A0            BSR     ESPCE       Or next address
C1B0 8D  C3A0            BSR     ESPCE
C1B2 20  E6              BRA     DIR

C1B4 8D  6E      COPYFL  BSR     FLGV
C1B6 8E  C657            LDX     #MSG8       Get file name
C1B9 BD  CD1E            JSR     PSTRNG
C1BC 8D  CD1B            JSR     INBUFF
C1BE 8E  C840            LDX     #FCBOUT
C1C1 8D  CD2D            JSR     GETFIL
C1C3 86  05              LDA     #5          Adjust extension
C1C5 8D  CD33            JSR     BETEXT
C1C8 6F  03              CLR     3,X         Define new file
C1CA 6F  08 17           CLR     23,X
C1CD 6F  0F              CLR     15,X
C1CF 86  02              LDA     #2          Open for write
C1D1 A7  84              STA     0,X
C1D3 BD  D40A            JSR     FMS
C1D6 86  FF              LDA     #-1
C1D8 A7  88 38           STA     56,X

C1DB 8E  0520    PRSECT  LDX     #FCBIN      Get a sector
C1DE FC  0100            LDD     TABLE
C1E1 27  2C              BEQ     FERM        Over, close file
C1E3 ED  88 1E           STD     30,X
C1E6 86  01              LDA     #1          In slot 01
C1E8 A7  03              STA     3,X
C1EA BD  C3B4            JSR     DEPLA       Shift table
C1ED 86  09              LDA     #9          Read sector
C1EF A7  84              STA     0,X
C1F1 BD  D40A            JSR     FMS
C1F4 30  88 0EC2         LEAX    194,X
C1F8 1F  12              TFR     X,Y
C1FA 8E  C840            LDX     #FCBOUT     Prepare for copy
C1FD 6F  84              CLR     0,X
C1FF 6F  03              CLR     3,X
C201 C6  82              LDB     #-126

C203 A6  A5      ECRIC   LDA     B,Y         Transcribe
C205 BD  0406            JSR     FMS         character by character
C208 5C                  INCB
C209 C1  7E              CMPB    #126        End of sector?
C20B 26  F6              BNE     ECRIC
C20D 20  CC              BRA     PRSECT      Yes, next sector

C20F 8E  C840    FERM    LDX     #FCBOUT     Close file
C212 86  04              LDA     #4
C214 A7  84              STA     0,X
C216 BD  D406            JSR     FMS

                 * DO GET NEXT COMMAND

C219 8E  C602    INST    LDX     #MSG5       Initials of commands
C21C BD  CD1E            JSR     PSTRNG
C21F 7E  C126            JMP     CLAV

C222 F6  040A    FLGV    LDB     OKFLG       Sector already read?
C225 27  01              BEQ     FLGN
C227 39                  RTS
C228 32  62      FLGN    LEAS    2,S         No, get rid of RTS
C22A 8E  04CB            LDX     #ERR        Error message
C22D BD  CD1E            JSR     PSTRNG
C230 20  E7              BRA     INST        Get next command

                 * REWRITE DATA

C232 31  3F      AVANT   LEAY    -1,Y        Preceding byte
C234 BD  CD24            JSR     PCRLF
C237 1F  21              TFR     Y,X
C239 8C  0404            CMPX    TEMP        Start of sector?
C23C 24  29              BCC     CHGOCT
C23E 20  5B              BRA     FINOCT

C240 BD  ED      REWRT   BSR     F BY
C242 8E  042F            LDX     #MSG10      Get addresses
C245 BD  CD1E            JSR     PSTRNG
C248 BD  CD1B            JSR     INBUFF
C24B BD  CD42            JSR     GETHEX
C24E 1F  10              TFR     X,D
C250 8E  0540            LDX     #FCBIN+64   Find wanted byte
C253 1F  12              TFR     X,Y
C255 10BF 0404           STY     TEMP        Note limits of text
C259 31  A9 0100         LEAY    $100,Y
C25D 10BF 0406           STY     TEMP1
C261 3A                  ABX                 Calculate address
C262 BD  CD24            JSR     PCRLF
C265 1F  12              TFR     X,Y         Set it aside

C267 17  0132    CHGOCT  LBSR    ESPCE       Display present byte
C26A 17  012F            LBSR    ESPCE
C26D BD  CD3C            JSR     OUTHEX
C270 17  0129            LBSR    ESPCE
C273 17  0126            LBSR    ESPCE
C276 BD  CD15            JSR     GETCHR      Get new value
C279 81  27              CMPA    #''         Is it alphanumeric?
C27B 27  19              BEQ     PRALPH
C27D 81  5E              CMPA    #'^         Is it a stepback?
C27F 27  B1              BEQ     AVANT
C281 BD  23              BSR     AJHEX       No, process it
C283 1F  89              TFR     A,B
C285 58                  ASLB
C286 58                  ASLB
C287 58                  ASLB
C288 58                  ASLB
C289 BD  CD15            JSR     GETCHR      Get other nybble
C28C BD  18              BSR     AJHEX       Process it
C28E B4  0F              ANDA    #%00001111
C290 34  04              PSHS    B           And combine them
C292 AB  E0              ADDA    0,S+
C294 20  2D              BRA     RMPOCT

C296 BD  CD15    PRALPH  JSR     GETCHR      Get the character
C299 20  28              BRA     RMPOCT

C29B 32  62      FINOCT  LEAS    2,S         Get rid of RTS
C29D 17  000C            LBSR    AFFICH      Show sector
C2A0 20  31              BRA     RENOIE

C2A2 32  62      REPROC  LEAS    2,S         Get rid of RTS
C2A4 20  1F              BRA     OCTSUI      Goto next byte

C2A6 81  0D      AJHEX   CMPA    #CRET       Process nybble
C2A8 27  F1              BEQ     FINOCT      End of operation?
C2AA 81  30              CMPA    #'0         No, see if n.<0
C2AC 25  F4              BCS     REPROC
C2AE 81  46              CMPA    #'F         ... or n.>15
C2B0 22  F0              BHI     REPROC
C2B2 81  41              CMPA    #'A         ... or between 9 and A
C2B4 24  04              BCC     PRHEX2
C2B6 81  39              CMPA    #'9
C2B8 22  E8              BHI     REPROC

C2BA 80  30      PRHEX2  SUBA    #'0         From ASCII to hex
C2BC 81  09              CMPA    #9
C2BE 23  02              BLS     PRHEX3
C2C0 80  07              SUBA    #7
C2C2 39          PRHEX3  RTS

C2C3 A7  A4      RMPOCT  STA     0,Y         Write new byte
C2C5 31  21      OCTSUI  LEAY    1,Y         Goto next
C2C7 BD  0024            JSR     PCRLF
C2CA 1F  21              TFR     Y,X
C2CC 8C  0404            CMPX    TEMP1       End of sector?
C2CF 2C  CA              BGE     FINOCT
C2D1 20  94              BRA     CHGOCT

C2D3 8E  D4AB    RENOIE  LDX     #MSG14      Rewrite sector?
C2D6 BD  CD1E            JSR     PSTRNG
C2D9 BD  CB15            JSR     GETCHR
C2DC 81  59              CMPA    #'Y
C2DE 1026 FF37           LBNE    INST        No, get next command
C2E2 8E  0520            LDX     #FCBIN      Yes, send sector to disk
C2E5 86  0A              LDA     #10
C2E7 A7  84              STA     0,X
C2E9 BD  D406            JSR     FMS
C2EC BD  CD24            JSR     PCRLF
C2EF 16  FF27            LBRA    INST

                 * READ A SECTOR

C2F2 7C  040A    RDSECT  INC     OKFLG
C2F5 8E  0100            LDX     #TABLE      Initialize table
C2F8 BF  0400            STX     POTBL
C2FB 8E  C561            LDX     #MSG2       Get address
C2FE BD  CD1E            JSR     PSTRNG
C301 BD  CD1B            JSR     INBUFF
C304 BD  CD42            JSR     GETHEX
C307 1025 FE15           LBCS    REDEG       In case of error, exit
C30B 9F  053E            STX     PIST

C30D 8E  0400    AJTABL  LDX     POTBL       Refer to table
C310 FC  053E            LDD     PIST
C313 ED  81              STD     0,X++       Write down address
C315 6F  84              CLR     0,X         Clear next position
C317 6F  01              CLR     1,X
C319 9F  0400            STX     POTBL       Note position
C31C 8E  0520            LDX     #FCBIN
C31F 86  09              LDA     #9          Read the sector
C321 A7  84              STA     0,X
C323 BD  D406            JSR     FMS
C326 03                  BSR     AFFICH      and display it
C327 16  FEDD            LBRA    INST

                 * DISPLAY A SECTOR

C32A 7F  0403    AFFICH  CLR     LIGN2
C32D 86  0C              LDA     #$0C        Clear screen
C32F BD  CD1B            JSR     PUTCHR
C332 8E  04BE            LDX     #MSG16      Display address
C335 BD  CD1E            JSR     PSTRNG
C338 8E  053E            LDX     #FCBIN+30
C33B BD  5A              BSR     IMPHEX
C33D 30  01              LEAX    1,X
C33F BD  56              BSR     IMPHEX
C341 8E  C574            LDX     #MSG4       Column heading
C344 BD  CD1E            JSR     PSTRNG
C347 BD  C024            JSR     PCRLF
C34A 8E  0403            LDX     #LIGN2      Line numbers
C34D 8D  48              BSR     IMPHEX
C34F 8D  49              BSR     EXPCE
C351 20  0A              BRA     SCT
C353 8F  0404    SECT2   STX     TEMP        Reposition
C356 8D  47              BSR     COLONN
C358 BE  0404            LDX     TEMP
C35B 20  08              BRA     SEC
C35D 8E  0540    SCT     LDX     #FCBIN+64   Start of contents
```

```
C360 86 10          LDA   #16     Count of lines
C362 B7 0402        STA   LIGN
C365 C6 10    SEC   LDB   #16     Count of columns
C367 BF 0404        STX   TEMP
C370 34 04    SECT3 PSHS  B
C372 BD 29          BSR   IMPHEX  Write a byte
C374 30 01          LEAX  1,X
C376 35 04          PULS  B
C378 5A             DECB          Complete?
C379 26 F5          BNE   SECT3   No, goto next

C37B BD 23          BSR   ESPCE
C37D BE 0404        LDX   TEMP    Replace counters
C380 C6 10          LDB   #16
C382 A6 84    SECT4 LDA   0,X     Note ASCII equivalent
C384 84 7F          ANDA  #$7F
C386 81 1F          CMPA  #$1F    Replace control character
C388 22 02          BHI   SECT5
C38A 86 2E          LDA   #'.     ...by a period
C38C BD CD1B  SECT5 JSR   PUTCHR
C38F 30 01          LEAX  1,X
C391 5A             DECB          Finished?
C392 26 EE          BNE   SECT4   No, goto next
C394 BD CD24        JSR   PCRLF
C397 7A 0402        DEC   LIGN    Next line
C39A 26 B0          BNE   SECT2
C39C 39             RTS

C39D BD CD3C  IMPHEX JSR  OUTHEX  Writes 2 hexes
C3A0 86 20    ESPCE LDA   #SPACE
C3A2 7E CD1B        JMP   PUTCHR

C3A5 86 10    COLONN LDA  #16     Print col. numbers
C3A7 BB 0403        ADDA  LIGN2
C3AA B7 0403        STA   LIGN2
C3AD 8E 0403        LDX   #LIGN2
C3B0 BD E9          BSR   IMPHEX
C3B2 20 EC          BRA   ESPCE

C3B4 108E 0100 DSPLA LDY  #TABLE  Shift address table
C3B8 EC 22     PLUS LDD   2,Y     Move back one value
C3BA ED A1          STD   0,Y++   by two bytes
C3BC 10BC 0480      CMPY  POTBL
C3C0 26 F6          BNE   PLUS
C3C2 39             RTS

* SKIM THROUGH A FILE

C3C3 8E 0520  SKMFIL LDX  #FCB1N  Point to FCB
C3C6 108E 0400       LDY  POTBL
C3CA FC 053E  PROCH  LDD  PIST    Get address
C3CD FD 0408         STD  DPIST   Note it
C3D0 EC 88 40        LDD  64,X    Get next address
C3D3 27 12           BEQ  DERN    End of file?
C3D5 F0 053E         STO  PIST    No, note address
C3D8 ED A1           STD  0,Y++   Move the pointer
C3DA 6F A4           CLR  0,Y     Clear position
C3DC 6F 21           CLR  1,Y
C3DE 86 09           LDA  #9      Read the new sector
C3E0 A7 84           STA  0,X
C3E2 BD D406         JSR  FMS
C3E5 20 E3           BRA  PROCH   Goto next
C3E7 EC 88 20 BERN   LDD  32,X    Get file length
C3EA FD 0400         STD  LONG
C3ED 10BF 0400       STY  POTBL
 3F4 17 FE2F ANOTHF  LBSR FLOY
C3F7 8E 0100         LDX  #TABLE  Initialize table
C3FA BF 0400         STX  POTBL
C3FD FC 053E         LDD  PIST    Compute next address
C400 3C              INCB
C401 C1 3A           CMPB #$3A
C403 23 09           BLS  ANTHF2  Change tracks if
C405 C6 01           LDB  #1      necessary
C407 4C              INCA
C408 81 4C           CMPA #$4C
C40A 1022 C0F3       LBHI WARMS   End of file, exit
C40E FD 053E ANTHF2  STD  PIST    Note address in table
C411 16 FEFE         LBRA AJTABL

* MESSAGES

C414 0C       MSG1  FCB  CLSCR
C415 20 20 20 20    FCC  "                HARD-READ AND COPY A DISK"
C41C 0D0A           FDB  $0D0A
C41E 2 2  0 20      FCC  "                ------------------------"
C424 0D0A           FDB  $0D0A
C426 20 49 4E 53    FCC  " INSTRUCTIONS"
C473 0D0A           FDB  $0D0A
C475 20 20 52 2D    FCC  "  R- Read some sectors",CRET,LNFEED
C48D 20 20 4E 2D    FCC  "  N- Next sector ",CRET,LNFEED
C4A0 20 20 41 2D    FCC  "  A- Another file in sequence",CRET,LNFEED
C4BF 20 20 53 2D    FCC  "  S- Skim through file ",CRET,LNFEED
C4D8 20 20 43 2D    FCC  "  C- Copy on other disk",CRET,LNFEED
C4F1 20 20 57 2D    FCC  "  W- Rewrite data",CRET,LNFEED
C504 20 20 46 2D    FCC  "  F- Return to FLEX",CRET,LNFEED
C519 20 20 54 2D    FCC  "  T- Table of sectors",CRET,LNFEED
C530 20 20 4C 2D    FCC  "  L- Last sector",CRET,LNFEED
C542 20 20 4D 2D    FCC  "  M- Menu of commands",CRET,LNFEED
C559 57 68 69 63    FCC  "Which? ",$04

C561 41 64 72 65 MSG2  FCC  "Adress of sector? ",$04
C574 20 20 20 20 MSG4  FCC  "     00 01 02 03 04 05 06"
C58C 20 30 37 20       FCC  " 07 08 09 0A 0B 0C 0D 0E 0F"
C5A7 20 20 30 31       FCC  "  0123456789ABCDEF",CRET,LNFEED
C5B8 20 20 20 20       FCC  "    ------------------------"
C5D4    20 20 2        FCC  "--------------------------------"
C5EF 20 20 20 20       FCC  "  ----------------",$04

C602 43 6F 6D 6D MSG5  FCC  "Command (R-N-A-S-C-A-T-M-M-F)? ",$04
C622 4E 6F 20 6D MSG6  FCC  "No more sectors. ",$04
C634 0C          MSG7  FCB  CLSCR
C635 20 54 52 20       FCC  " TR SEC",CRET,LNFEED,$04
C63F 0C          MSG8  FCB  CLSCR
C640 20 53 6F 75       FCC  " Source disk must be"
C654 20 69 6E 20       FCC  " in d1",$07,CRET,LNFEED

C690 4E 61 6D 65       FCC  "Name of file (ext .BAS)? ",$04

042F                   ORG  $42F

0426 42 79 74 65 MSG10 FCC  "Byte can be written in hexadecimal"
0452 20 66 6F 72       FCC  " form, (A5)=,CRET,LNFEED
046F 6F 72 20 69       FCC  "or in ASCII, preceded by a single "
0481 71 75 6F 74       FCC  "quote ('R),",CRET,LNFEED
04BE 43 68 61 6E       FCC  "Change which byte (hex)? ",$04
04A8 52 65 77 72 MB 14 FCC  "Rewrite this sector? ",$04

04BE 20 41 44 44 MSG16 FCC  " ADDRESS: ",$04
04C9 49 6C 6C 65 ERR   FCC  "Illegal command. "
04DA 79 6F 75 20       FCC  "You must do R first.",CRET,LNFEED,$04
04F1 46 69 72 73 ERR2  FCC  "First sector. "
04FF 63 6F 6D 6D       FCC  "Command ignored",$04

       END   PREM
```

MAGISPEL

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STAR KITS' MAGIC-SPELL--review

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Text editing and word processing are useful functions performed by a personal computer. The text editors and processors for 6800 and 6809 systems are among the most versitile available. It is easy to type an article or report on a terminal, then edit awkward phrases, misspellings and mistakes as you go along. The text may be saved on a disk file or a hardcopy printout made. Words and lines of text can easily be changed, deleted or moved. About the only thing a text package will not do is proofread copy and correct misspellings or typographical errors.

STAR KITS (P.O.Box 209, Mt. Kisco, New York 10549) is offering such an option to users of 6800 systems. MAGIC-SPELL is a 4K machine language program that compares each word in a text file against a master dictionary and lists each word it does not find.

MAGIC-SPELL is delivered on two 5¼" diskettes in versions for TSC's FLEX 2, FLEX 9, Mini-FLEX and the Percom DOS. The price is $84.95.

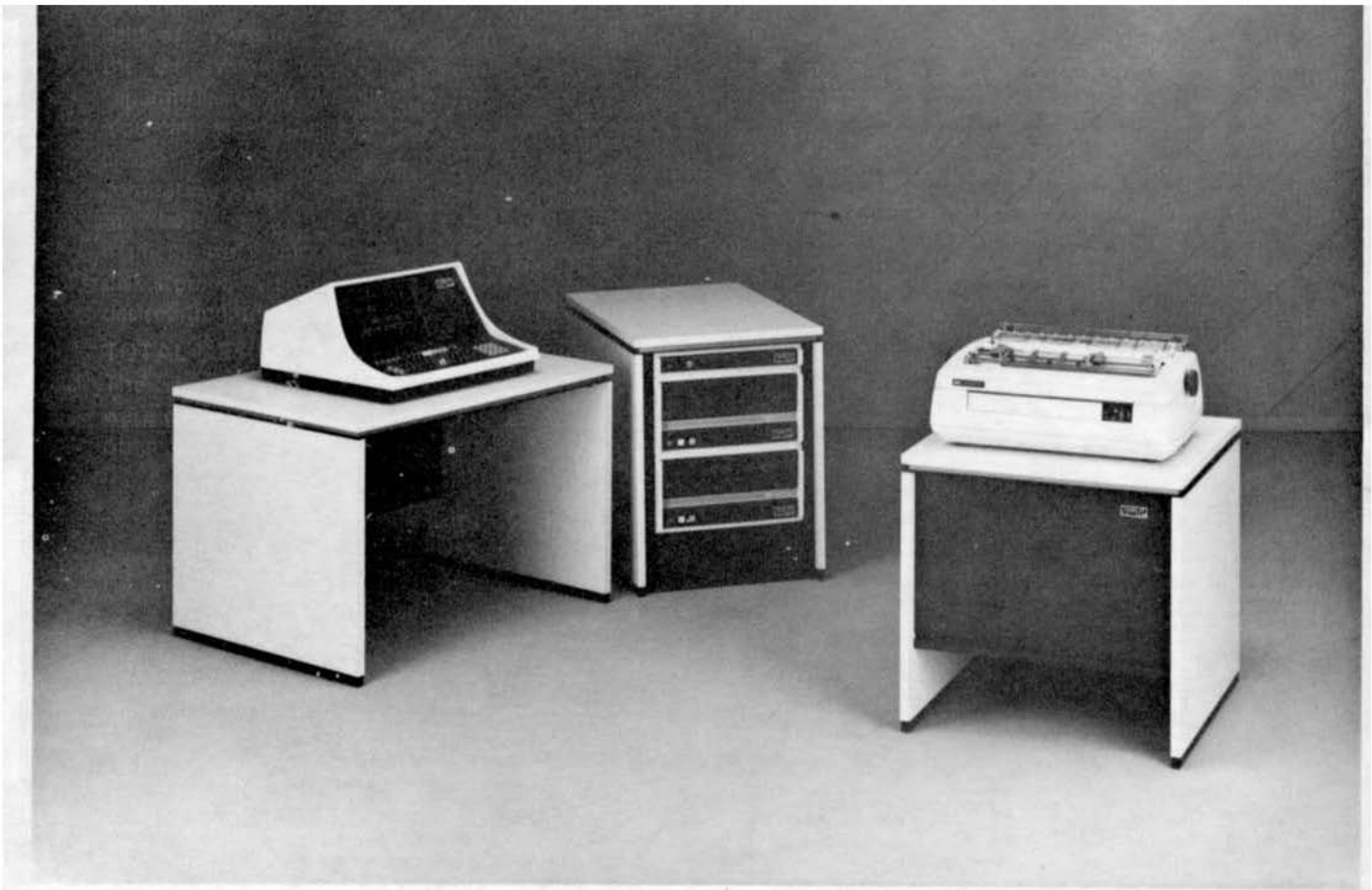
One disk contains the MAGIC-SPELL program and a commented source listing. The second disk contains MAGIC-SPELL's dictionary file.

The dictionary is a single file occupying the entire disk. It contains over 10,000 words and is easily modified by a text editor to customize it for names or technical terms. It may be added to, shortened or special editions created.

The dictionary is a text file with each word, in all caps, seperated by a carriage return, arranged in alphanumeric order. When MAGIC-SPELL's option to add words to the dictionary is selected, it asks for the name or the DRIVE of the new dictionary and creates it. The new file contains all the words in the old file and the additions. Dictionary size is limited only by the capacity of the disk. A dictionary can even be split between several disks. A longer dictionary requires more processing time since the main program reads the entire file.

MAGIC-SPELL never updates a file in place. It writes a new file rather than rewriting the existing file. This allows complete recovery from operator or system errors.

When MAGIC-SPELL is run, it asks for the name or the DRIVE of the text file to be proofed. Words in this file may be up to 31 characters long. Hyphenated words at the end of a line are reconstructed. Words with internal punctuation are not seperated. It then asks if it should consider any group of characters surrounded by spaces or carriage returns or if it should only select



THE COMPLETE BUSINESS SYSTEM

+Multiuser+Highly Expandable+Cost Effective

S+ THE CONCEPT

The S+ system is a modular computer system in which all portions of the hardware and software are designed to work together in the most efficient way possible. An S+ single user system with floppy disk storage is a competitive and cost effective entry level system. Unlike most other small computers being sold as "personal", or "small business" machines, the S+ system may be expanded to maximum capabilities using this same hardware and software. You cannot end up with a DEAD END system that cannot be expanded and whose software is not compatible with larger machines. A basic S+ system may be expanded to thirty-two users, a megabyte of main memory and hundreds of megabytes of hard disk storage by simply plugging in, or connecting the desired upgrade equipment.

TOTAL DESIGN—Hardware and Software

The S+ system is an integrated hardware and software design. The two complement and enhance each other in this system. The UniFLEX® operating system used in the S+ systems is patterned after the Bell Laboratories UNIX® operating system, one of the most admired and widely used operating systems in the world. Instead of being an afterthought, the software is part of the design of the S+ system. You can be sure that with this approach that all parts of the computer operate with maximum efficiency and cost effectiveness.

THE CENTRAL PROCESSOR

The basic S+ system is configured with 256K bytes of memory and can be expanded to more than 1 million bytes. An efficient and fast hardware memory management system is used to allocate the available memory among the users on a dynamic basis. As little as 8K bytes, or the entire memory—if needed—can be used by any individual user. This makes it possible to run very large programs on the system, but it also uses no more memory than necessary for a particular job. The increase in cost effectiveness of this system over crude and outdated bank switching arrangements is dramatic.

The central processor runs in both user and supervisor states. It can detect and reject a defective user program. It is impossible for a user program to go bad and stop the entire system, as can happen quite easily in less sophisticated systems.

Task switching is accomplished by use of a multiple map RAM memory, with sixty-four individual task maps. Each task can access from 4 to 64 K-bytes of memory. Multiple tasks may be used in programs that require more than 64K bytes of memory for execution. When a task is completed the memory is automatically released for other use.

SOFTWARE

The S+ operating system, UniFLEX® is a multiuser, multitasking operating system based on the UNIX® operating system that has been used for many years on Digital Equipment Corp. PDP-11 series minicomputers. It is considered one of the most sophisticated and "user friendly" operating systems available. Variations of UNIX® are rapidly becoming standard on mini and larger microcomputers.

A large variety of languages are available for use with the system. These include FORTRAN, COBOL, BASIC, and Pascal. Word processing packages are also available to give you full text processing capability on the system.

Applications programs are available in large quantities in many fields. This includes general business, medical, dental, veterinary, library and real estate management; plus others. Since the system is multiuser it can also be connected to cash registers to produce a point-ofsale terminal system combined with the computer. The possibilities for application of this system are endless.

THE I/O SYSTEM

The S+ system is totally interrupt driven. All terminal and printer I/O devices connect to an I/O bus separate from the main bus. Up to thirty-two separate devices may be connected to the I/O bus at any one time. If I/O activity is great enough to cause an unacceptable slowdown in system operation, a separate I/O processor can be installed in the system. This plug-in option removes all I/O handling overhead from the main processor and allows operation of up to thirty-two external devices at 9,600 baud. Without an integrated total design, as in the S+ system, it would become impractical to use a UNIX®type operating system in a situation with heavy terminal I/O activity.

DISK STORAGE

A wide range of disk storage capacity is available for the S+ system, from 2.5 M-byte floppy disks to an 80 M-byte Winchester and many sizes between. All disk controllers use direct memory access (DMA) type operations to maximize data transfer and to minimize overhead on the main processor. The Winchester disks also use intelligent controllers along with DMA transfers to preserve the performance that these type devices are capable of giving. Without this distributed intelligence the system performance would be greatly degraded. The UniFLEX®operating system is designed to work at maximum efficiency with this type disk system. The data transfer rates achieved by this combination rival those of large minicomputers.

COMMUNICATIONS

A high speed local network communications system is available to interconnect S+ systems. The VIABUS® network will allow communication between systems at data rates of over 400K baud. Such a system makes it possible to share data between local systems in an efficient and low-cost manner.

AVAILABLE SOON

Tape backup—20M-Byte in less than 15 minutes on a standard ¼ inch cartridge.

Mini-Wini—5 and 10 M-Byte Winchesters—5¼ inch package. Winchester performance, for smaller systems in a small package. UniFLEX® compatible design.

Large Capacity—190 and 340 M-Byte Winchesters, plus SMD cartridge drives.

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UNIX is a registered trademark of Bell Labs.

VIABUS is a registered trademark of Southwest Technical Products Corporation.

reasonable words. The first option is normally used for proofreading. The second, which does not consider words with numbers or punctuation, is used to scan a text file to add words to the dictionary.

The text file is read and each distinct word is stored, in alphanumeric order, in memory. A file much larger than would normally fit into memory can be made since each word is saved only once, despite the number of times it is used. A 32K system will process 40CK of characters with little difficulty.

Once the text is created in memory, the program asks for the name or the DRIVE of the dictionary. The original text file disk may now be removed. If new words are to be added to the dictionary, this option is selected. Each word in memory is then compared to each word in the dictionary. When an undefined word is encountered, the program prints the word and prompts the user to select one of several options. Control may be passed to the DOS, the word may be ignored, added to the dictionary, marked with "*e*" in the text file or a fast mark feature may be selected which automatically marks any questioned words without issuing the prompts.

FLEX's "P" command, or a user supplied printer driver for the Percom system, will provide a listing of all questioned words. If a text file is being saved, all questioned words are marked and can easily be found with an editor. When MAGIC-SPELL is finished processing, control is returned to the DOS.

The latest version of MAGIC-SPELL also includes an error correcting feature. When a questioned word is found, the program asks if a new text file should be made with the words either marked or corrected. If corrections are desired, it issues a prompt for each word it does not understand. The options include ignoring the word, marking or changing it. If a change is desired, the previous three or four lines of text are listed and the user enters the correct word, of up to 32 characters long.

The only option needed in the Percom version is a switchable printer selection. There is room in the source code for this, but the user must supply his own routines.

MAGIC-SPELL's frequent prompts and clear documentation make it easy to use. The package is usable with even a single drive system. Two or more drives allow the full power of MAGIC-SPELL to easily beused.

BIT Bucket

NEWSRELEASE

FOR IMMEDIATE RELEASE — NOVEMBER 12, 1981

COMPUTER MANUFACTURER INTRODUCES TAPE BACKUP OPTION FOR WINCHESTER BASED COMPUTER SYSTEM LINE

WESTLAKE VILLAGE, CA...SMOKE SIGNAL, manufacturers of the CHIEFTAIN (tm) Series of business computers, and PATHFINDER (tm) Series of Development Systems, announces tape streamer backup as an option for the company's line of 8-inch and 5¼-inch Winchester-based systems. The tape streamer is now a standard option on any CHIEFTAIN and PATHFINDER Winchester system for an additional $1500 to list prices of the computer system. The tape streamer will store up to 20 Megabytes on ¼-inch cartridge tape.

With a tape streamer, the computer systems can now transfer 20 Megabytes of data in less than 5 minutes at 90 ipa. The CHIEFTAIN/PATHFINDER Series also incorporate two means of backup with the streaming tape drive: file by file, or a complete backup with one single command. Drive-to-tape and tape-to-drive data transfer is provided.

The CHIEFTAIN/PATHFINDER Series of Winchester computer systems are based around 5¼-inch and 8-inch Winchesters ranging from 4 up to 60 Megabytes of storage and more. All systems are based around the state-of-the-art 6809 2 MHz microprocessor, and all computers come standard with 64K of RAM. Both CHIEFTAIN and PATHFINDER have standard options of operating Smoke Signal's DOS69D operating system or the UNIX comparable multi-user, multi-tasking operating system - OS-9 LEVEL I & LEVEL II. CHIEFTAIN computers have application software, business accounting software, data base management applications and special applications available. The PATHFINDER Series provides complete 68XX processor family development tools such as a 68XX-family macroassembler, a powerful DEBUGGER, and MDOS/SMOKEsior capabilities. An in-circuit emulator is an option for PATHFINDER Development Systems. Tape streamer options for the models 9SW10, 9SW30, and SW15T20 are available from Smoke Signal and Smoke Signal Dealers. Dealer opportunities are available.

For further information please contact: Deborah Conrad, Manager Dealer Sales and Support
and: Jim Allday National Sales Manager

at Smoke Signal Broadcasting
31336 Via Colinas
Westlake Village, CA 91362
(213) 889-9340

word's worth

P.O. Box 28954
Dallas, Texas 75228

FIG-FORTH for FLEX 9.0

FIG does not supply machine-readable source to their otherwise excellent package. Two disks - (1) Source in FLEX format, by R. J. Talbot, Jr., (2) polyFORTH-compatible editor published in Forth Dimensions, by S. H. Daniel ('screen' disk). Supplied without comments, except for a few minor bug fixes. Intended to supplement, not replace, the FIG-supplied documentation. Saves about 10 hours of typing. FLEX 9.0 version available now, DOS69D version to be announced. This software is published by FIG, and is in the public domain.

FORTH for FLEX 9.0 (2 disks) $19.50

C Compiler for 6809

Based on SMALL-C as published in Dr. Dobbs by Ron Cain. Transported to DOS69D by Allen Bettelger, adapted to FLEX by Bill Knight. FLEX version requires a special loader (included). Current plans are to produce a full C in three steps: Ver. 1.0 available December 1st; ver. 2.0 - 2nd Q/82; ver. 3.0 - 4th Q/82. Prices to be announced. Liberal upgrade policy. User's guide, binary for compiler, and source for run-time library. 48K system recommended.

For FLEX 9.0 (with loader) $52.50
For DOS69D $47.50

RLOAD 3.0

Relocating linking loader for TSC's absolute assembler. Enhanced version of RLOAD published in '68' Micro Journal by HL Harkness. Source and documentation on the disk. Public domain.

RLOAD for FLEX 9.0 $17.50

These programs normally supplied on 5" disk. For 8", add $2.00 per disk. Prices good until February '82. Shipping and handling included. Texas residents: add $0.25 sales tax per 5" disk, $0.35 per 8" disk. Specify operating system and disk size. Visa and MasterCard prices 5% higher. Allow 4 weeks for check. Please do not send cash through the mail.

FIG stands for the FORTH Interest Group.
DOS69D is a trademark of Smoke Signal Broadcasting.
FLEX is a trademark of Technical Systems Consultants.

STAR-KITS

P. O. Box 209
Mt. Kisco, New York 10549

December 6, 1981

Mr. Don Williams
'68' Micro Journal
P. O. Box 3010
Hixson TN 37343

Dear Don:

I'd be grateful if you would publish this letter in your Bit Bucket:

One of our major principles is to make sure that Star-Kits stands behind its products. If we discover a bug, or make a major improvement, we try to let our customers know as soon as possible. For example, we are right now making a major change in MAGIC SPELL to speed it up by a factor of two or so.

The problem is that we have hundreds of customers, not just in the U.S. but also in Europe, Asia, Africa, South America, and Australia (sorry ... not in Antarctica ... yet!) It becomes a bit difficult to maintain a current mailing list, and expensive as well. So we ask our customers to help. Each Star-Kits manual has a User Registration Form at the back, and a request that each customer send us the form and a self-addressed, stamped envelope. We then use these envelopes to send out updates, modifications, or Users' Group Newsletters.

Unfortunately, many customers don't bother to send in their forms and envelopes, thereby missing out on some very useful information. The purpose of this letter is to ask all our customers to help us help them. Make sure to send in your forms and envelopes. Folks!

Sincerely yours,

Peter Stark

Peter A. Stark

TEXAS COMPUTER

817-275-1848 • P.O. BOX 120816 • ARLINGTON, TX 76012

December 8,1981

Mr. Don Williams
'68 Micro Journal
5900 Cassandra Smith
Hixson, Tn 37343

Dear Mr. Williams:

TEXAS COMPUTER would like to announce the immediate availability of the DP8 dual port serial board for the 6830 bus.

We at TEXAS COMPUTER believe that this board will fill a need in the line of serial boards presently available for the 6830 Bus. We have tried to "design in" as many user options and conveniences as possible while maintaining an attractive price.

How many times have you borrowed or bought a terminal or printer and connected it to your system only to find that you can't seem to make it work without the RS232 handshake lines. With the TEXAS COMPUTER DP8 Board your problems are over! The DP8 board buffers and brings all MC6850 handshake lines and two RS232-C driver lines out to a jumper area for easy connection to the DB25 connectors. This method makes it easy for the user to select the lines necessary for handshaking and then connect them as needed.

The TEXAS COMPUTER DP8 is dual port serial board using two MC6850 ACIA's. As always, gold edge connectors are standard and two side mount DB25 connectors are used for easy hookup to the users equipment. All voltages (+5,+12,-12) are provided by 1 amp regulators. All signal lines are buffered by Motorola RS232-C line drivers and receivers which limit current output to 10ma. All IC's are socketed. Separate transmit and receive clocks may be implemented on this board by cutting one etch and jumpering the baud rate desired between two jumper pads.

Documentation is included that demonstrates several full handshake hookups from terminals and modems to the port. The DP8 board is available for $69.00 + $3.00 for shipping and handling. Texas residents please add 5% for sales tax.

Sincerely,

Dave C. Bolen

Dave C. Bolen

DON WILLIAMS, EDITOR
COMPUTER PUBLISHING, INC.
'68 MICRO JOURNAL
5900 CASSANDRA SMITH
HIXSON, TN. 37343

DEAR DON:

BEING A NEW READER TO YOUR MAGIZNE I WOULD LIKE TO TAKE THIS OPPORTUNITY AND TELL YOU WHAT A FINE MAGIZNE YOU HAVE FOR THE 68XX USER'S. MY OWN SYSTEM IS A SWTPC 6800 OF WHICH I AM NOW TRYING TO EXPAND TO A DISK SYSTEM.

MY MAIN REASON FOR WRITING THIS LETTER IS TO INFORM YOU AND I HOPE THROUGH YOU MAGIZNE, ALL THE 68XX USER'S OF A 68XX USER MEETING AND GET TOGETHER AT THE CHARLOTTE MAP FEST & COMPUTER SHOW' WHICH WILL BE MARCH 20 & 21 1982. THE SHOW WILL BE LOCATED AT THE CHARLOTTE CIVIC CENTER IN DOWNTOWN CHARLOTTE, NORTH CAROLINA. A LOT OF THE OTHER USERS WILL BE HOLDING MEETING AT THIS SHOW ALSO. WE HAVE TENTALIVELY SELECTED THE MEETING TIME FOR THE 68XX USER GROUP FOR SUNDAY THE 21 AT 11:00.

DON, YOU SHOULD HAVE RECEIVED A LETTER FROM THE SHOW COMMITTEE ABOUT BUYING A BOOTH FOR THIS SHOW. I DON'T KNOW WHAT THE ATTITUDE OF THE COMPUTER GROUPS ARE ABOUT GOING AT SHOWS BUT WE ARE GOING TO TRY TO TRY AND MAKE THIS A VERY SUCCESSFUL ONE FOR THE COMPUTER PATRONS. HOPE YOU WILL BE ABLE TO COME.

YOURS TRULY,

Wayne L. Setzer

WAYNE L. SETZER
3215 DUNAIRE DR.
CHARLOTTE, NC 28205

APPLICO

SYSTEMS & SOFTWARE (714) 875-5969

ORGANIZATION INFORMATION SYSTEM

The APPLICO Organization Information System (ORGINFO) can be an asset to any business, club, church, school, or union. If you want to keep track of your customers or clients or members, you can do it better and cheaper with ORGINFO.

The menu-driven programs in this system are easy to use and have been written with the most current techniques. All output in ORGINFO may be "spooled" to a file for background processing, may be routed to a printer, or may be directed back to the requesting terminal.

ORGINFO will produce rosters, mailing labels, phone directories, and many more functions that are tedious work around the office. ORGINFO maintains names, addresses, and phone numbers, and allows you to define your own "Categories" of data for your members. What is a category? It is a piece of information that has some value to you, such as offices held, skills, wife's name, important dates (birthday, hire dates, etc.), or type of customer. Anything, it's user-defined.

Some of the unique functions of ORGINFO include:

1. Produce an organization roster. This is a formatted listing of every name and all category data in the file.

2. Produce mailing labels. Print standard size (3 1/2" X 15/16", tab 5615) labels 1-up, 2-up, 3-up, or 4-up in any of three different sequences: zip-code sequence, name (alpha) sequence, or non-profit organization sequence. The non-profit sequence is required by the U.S. Post Office to obtain reduced non-profit organization mailing rates. You may print labels for all names within an organization or select one or more "categories" of names. The sort/merge program used is a very efficient modified "shell" sort algorithm which dynamically allocates needed memory. If you wish, four trailing labels will be produced to be used for return mail.

3. Produce the phone directory. This report is a compact listing which includes the name, address, and phone number of your members as well as any category data you select.

4. Produce a category report. This program selects all names in a requested category (such as preferred customers, or officers), sorts the selected file in name sequence, and produces a formatted report.

5. Build "Micro-script" interface file. This program selects all names in a requested category or all names in the file and produces a file that may be used to print form letters.

Start saving time on your membership lists now.

APPLICO SYSTEMS & SOFTWARE
5601 Palomar Avenue
San Bernardino, CA 92404

November 20, 1981

Mr.Don Williams
'68' Micro Journal
3018 Hamill Rd.
Hixson, Tn. 37343

Dear Don,

As many Flex users have noted, printer spooling does not seem to function when a 6809 processor card is used in an 'old' 6800 box. Confusion concering this problem is compounded by the fact that users of 8 inch systems and users of newer chassis deny the problem exists (frustrating to say the least!!).

The following patches will fix the printer spooler bug in FLEX Ver 2.0i as distributed by SWTPC for 5" disk systems. The first patch will move the MP-T timer back to port 64. This is a must when running 5" FLEX in the old (6800) box.
Using the FIX command, make the following changes to PRP.CMD:

```
 6C3B1 - 00 05  old data
         00 04  new data
```

The next patch disables the disk drivers from deselecting the drives while spooling. FIX FLEX.SYS:

```
0CB0B - 86 80 B7 E0 14  old data
        12 12 12 12 12  new data

LINK FLEX.SYS
```

This fix will alleviate the problem and allow proper spooling activity, but is not a best fix. If any readers are interested in a reassembled version of Flex.sys which we feel is a better fix, please write or call and we will be happy to provide our solution. We would like to thank Nora Aeitzel at SWTPC for his gracious help in providing the information necessary for a solution.

We may be reached by phone at (214) 422-3119 / 422-3377 (8 am - 4 pm cst)

Sincerely,

Jim Cordill
John Rosas

MDP

MARK DATA PRODUCTS

NEWS RELEASE

Mark Data Products releases CAVE HUNTER, a new action game for the 16K TRS-80 Color Computer. Maneuver your way to the bottom of a spooky old cave to retrieve the treasures. It's not so easy! Passages lead in all directions and angry cave creatures pursue you relentlessly.

CAVE HUNTER is a fast-paced arcade game using hi-res graphics, sensational colors and a variety of unique sounds. Single or multiple players. Joysticks are required.

Priced at $24.95 this game is available postpaid from Mark Data Products, 23802 Barquilla, Mission Viejo, California, 92691, (714) 768-1551.

23802 BARQUILLA • MISSION VIEJO, CA 92691 • (714) 768-1551

META LAB COMPUTERS • PERIPHERALS • SYSTEMS

2888 Bluff Street Suite 100 • Box 1559 • Boulder, Colorado 80306 • (303) 499-4236

NEW SS50 PRODUCT

META LAB, established in 1974 as a research, development, and engineering firm, announces the first in a series of products for the SS50 Bus Computer --- the ADC 1200.

The ADC 1200 is a 12 BIT ANALOG TO DIGITAL CONVERTER BOARD designed for industrial, scientific, educational, and laboratory applications that require high speed and 12 bit accuracy and resolution.

The ADC 1200 combines a data acquisition module with a 6522 versatile interface adapter (VIA) in a powerful and compact form. This allows a full 12 bit, 16 channel data acquisition system on a single 50 pin board. The ADC 1200 features a high speed sample and hold amplifier, instrumentation amplifier, precision multiplexer, unipolar or bipolar operation, external clock input/output, external trigger, and a one year warranty.

Sampling rates up to 80,000 samples/second (12.5 uSec) are possible using the computer configurable single channel burst mode. Random sampling can be performed at rates in excess of 60 KHz using an overlapped mode. An aperture delay of less than 0.1 uSec can be achieved using a direct external trigger mode. The sampling can also be clocked externally or the external event can be triggered by the ADC 1200 using a handshake mode.

Extensive Pascal and Assembly Language Programs are provided which interface directly with the ADC 1200. These assembly modules and user interface programs provide tested examples of several of the hardware modes. The source of the assembly modules is included and can be used with little or no modifications to implement the user's specific requirements.

The ADC 1200 is one of a series of high quality SS50 based products produced by META LAB. Please write for detailed specifications on the ADC 1200 and other SS50 compatible products.

68MICRO JOURNAL
5900 CASSANDRA SMITH
COMPUTER PUBLISHING CENTER
PO BOX 849
MIXON, TN 37343

30 NOVEMBER 1981

DEAR SIRS:

IN THE DECEMBER ISSUE OF THE 68MICRO JOURNAL WAS AN ARTICLE WRITTEN BY D.F.W. MILLIDAN OF BURNABY, B.C. CANADA, ENTITLED "DIRECTORY". THIS PROGRAM PROVIDED THE READER WITH A MUCH NEEDED PROGRAM FOR MAKING A MASTER CATALOG OF DISKS WRITTEN WITH FLEX. THERE WAS ONE PROBLEM WITH THE PROGRAM. IT WAS WRITTEN IN "MINIFLEX" WHICH SEEMS TO BE A FORGOTTEN SYSTEM, OR LEAST A SYSTEM THAT HAS BEEN SUPERCEEDED BY BETTER SYSTEMS. IT WITH THIS THOUGHT IN MIND THAT THE FOLLOWING REVISIONS ARE SUBMITTED AS A SUGGESTION AS TO HOW TO UP-DATE THE PROGRAM TO RUN IN THE NEWER FLEX 2.0.

THE CHANGES ARE FEW AND ARE EASILY MADE. ONE WORD AS TO WHY THE CHANGES ARE NECESSARY. THE MINIFLEX USES 128 BYTES PER SECTOR FOR STORAGE ON THE DISK AND FLEX 2.0 USES 256. SO IF THIS IS NOT TAKEN INTO ACCOUNT, THE PROGRAM WILL OVER-WRITE ITS SELF IF YOU TRY TO RUN THE ORIGINAL PROGRAM IN FLEX 2.0. SO THE CHANGES TO BE MADE ARE AS FOLLOWS AND INCLUDE THE CHANGES TO RUN WITH 6800 FLEX 2.0 AND 6809 FLEX 2.0.

THE FIRST CHANGE IS TO THE "EQUATE" FUCTIONS:

FUNCTION	EQU	MINI	6800	6809
WARMS	EQU	$7103	$AD03	$CD03
GETCHR	EQU	$710F	$AD15	$CD15
INBUFF	EQU	$7115	$AD1B	$CD1B
PSTRNG	EQU	$7118	$AD1E	$CD1E
FCB.F	EQU	$711E	$AD24	$CD24
NXTCH	EQU	$7121	$AD27	$CD27
GETFIL	EQU	$7127	$AD2D	$CD2D
SETEXT	EQU	$7130	$AD33	$CD33
PRTERR	EQU	$713C	$AD3F	$CD3F
FMBCLS	EQU	$7B03	$B403	$D403
FMS	EQU	$7B06	$B406	$D406

DELETE THE CODE FROM LINE 166, ADDRESS 0145 THRU LINE 170, ADDRESS 014E AND SUBSTITUTE THE FOLLOWING CODE:

```
166          LDX   #RDFCB+3     STOR  READ FCB
167          STX   XTEMP1
168          LDX   #WRTFCB+3    STORE WRITE FCB
169          STX   XTEMP2
170          LDAB  #12          COUNT 12
171    LOOPO LDX   XTEMP1       GET REA FCB ADDRSSS
172          LDAA  0,X          GET CHARACTER FROM RDFCB
173          INX                BUMP POINTER TO NEXT CHAR IN RDFCB
174          STX   XTEMP1       STORE RECFCB
175          LDX   XTEMP2       GET WRITE FCB ADDRESS
176          STAA  0,X          MOVE CHARACTER TO WRITE FCB
177          INX                BUMP POINTER TO NEXT CHAR IN WRTFCB
178          STX   XTEMP2       STORE WRTFCB
179          DECB               DECREMENT COUNTER
```

CHANGE LINE 708 TO READ: * FILE CONTROL BLOCK IS 320 BYTES LONG.

```
CHANGE LINE 741 TO READ:
            BUFFER  RMB   256     BYTE    64-319=SECTOR BUFFER FOR DATA
CHANGE LINE 754 TO READ:
            BALNCE  RMB   208

CHANGE LINE 760 TO READ:
            DIRFCB  320           FILE CONTROL BLOCK FOR DIRECTORY

ADD BELOW BELOW LINE 780 'SAVER'
            XTEMP1  RMB   2
            XTEMP2  RMB   2
```

AND THAT IS ALL THERE IS TO IT. THESE CHANGES ADD A FEW LINES TO THE PROGRAM LENGTH, SO THE LINE NUMBERS GIVEN ABOVE ARE "BEFORE" THE ADDITIONS WERE MADE AND FOLLOWS THE NUMBERING OF THE ORIGINAL PROGRAM AS PUBLISHED IN THE DECEMBER ISSUE OF 68MICRO JOURNAL.

SINCERELY,

DON VANBEEK
16381 S STOLTZ RD
OREGON CITY, OREGON 97045
HUGO C WILDSCHUT
11304 SE STANLEY AVE
MILWAUKIE, OREGON 97222

TSC 6809 BASIC - CFM/3 Ver.9

HERE IS A WAY TO SAVE YOUR TSC 6809 CASSETTE BASIC PROGRAMS USING JPC'S CFM/3. THESE PATCHES FOR SAVE,PROGRAME AND LOAD HAVE BEEN IN USE FOR A FEW MONTHS. THE CFM V09300 MAY BE GIVEN FROM BASIC IN THIS FORM: X.CFM09 .

CFM/3 WAS IN EPROM AT E800 ON THE SWTP MP-09 BOARD: SWITCH #3 ON AND USE THE SECOND RUN POCKET IN FROM THE RIGHT EDGE OF THE BOARD.

BE AWARE THAT THIS IS THE FIRST VERSION OF THESE PATCHES. PERHAPS JPC PRODUCTS COMPANY WILL OFFER SOME MINOR REFINEMENTS IN THE FUTURE. MEANWHILE ENJOY THE 6809 WITH CFM/3 !

RAYMOND E. PATTERSON, FOX,AR 72051

```
                        NAM   CP/M-9 PATCHES FOR TSC 6809 BASIC
D900                    EQU   $D900
D902                    EQU   $D902
[illegible]             EQU   [illegible]
E000                    EQU   $E000
00C4                    EQU   $C4
                      * SAVE.PGM NAME  (FROM TSC 6809 BASIC)
                        ORG   $732
                        LDX   -933,U
                        LDY   -$6F,U
                        STY   $E6A
                        LEAX  1,X
                        BSR   MOVE
                        LDY   -$62,U
                        BSR   MOVE
                        LDY   -$37,U
                        BSR   MOVE
                        LDY   -933,U
                        BSR   MOVE
                        LEAX  -1,X
                        STX   ENDA
                        LEAX  $78,U
                        LBSR  VEXSAV
                        LBRA  RETNVP
MOVE                    STY   ,X++
                        RTS
                      * X.CFMCMD  (FROM TSC 6809 BASIC)
                        ORG   $274
                        FDB   $079F
                        ORG   $528
                        FDB   $9600
                        FDB   $0000
                        FCB   $00
                        ORG   $79F
                        LEAX  $76,U
                        LBSR  VEXCMD
                      * CFMS-9 LOAD TSC 6809 BASIC USER PROGRAM
                        ORG   $7CC
                        LEAX  $78,U
                        LBSR  VEXLOA
                        LDX   #$902
                        LDY   ,-X
                        STY   -$33,U
                        BSR   REMOVE
                        STY   -$37,U
                        BSR   REMOVE
                        STY   -$62,U
                        BSR   REMOVE
                        STY   -$6F,U
                        LBRA  $899
REMOVE                  LDY   ,--X
                        RTS

0 ERROR(S) DETECTED
```

Specialty Electronics, Inc.

INVENTORY

The Specialty Electronics Interactive Accounting System Inventory Control Package provides the tools for complete control of a large and active inventory, providing:

1. Reports for quantities on hand, quantities on order activity and many other categories.
2. Complete item description, category groups, supplier information, order dates, reorder quantities, etc.
3. Simple input and reconciliation procedures.

Requires OS9*, Runb*, direct addressed cursor terminal, 500K or larger disk system, 132 column printer.

Inventory Control I-code	$299.00
Complete Documentation	$ 19.95

Specialty Electronics Interactive Accounting System is based on the Osborne* Publication.

*Osborne is a trademark of Osborne McGraw Hill.
*OS9 and Runb are trademarks of Microware, Inc. and Motorola Corp.

(405) 233-1632 • P.O. BOX 541 • ENID, OKLAHOMA 73702

Dear Don,

Here is a listing of a proportional spacing print driver for the 40CPS Serial STARWRITER printer. Although at present I know of no text processor that will support proportional spacing on this printer, this is a start. I hope to develop one myself. If any big software house out there would like to cooperate in developing a proportional spacing processor for this printer and others to run under Uniflex I'd like to hear from them.

I might say that I am very pleased with this printer I got from you. This paragraph was written proportionally spaced using this driver. The width table may still need some adjustment. I am using a "Qume" print wheel here (Theme PS 10). The table can be changed for any printwheel.

Does anybody know where I can get some Spanish proportional print wheels?

Steve Searfoss
Apdo. 3-620
Col. Guerrero
Delg. Cuauhtemoc
03600 Mexico, D.F.
MEXICO

```
                        * PROPORTIONAL SPACING PRINTER DRIVER FOR
                        * THE STARWRITER DAISYWHEEL PRINTER
                        *
                        *   ************************
                        *   *  I M P O R T A N T   *
                        *   *                      *
                        *   * YOU MUST HAVE SWITCH #2 OF SW1 ON THE *
                        *   * I/O PCB  SET IN THE OPEN (UP) POSITION *
                        *   * FOR THE PRINTER TO WORK IN THE SERIAL *
                        *   * MODE AS THIS MODE ALLOWS PROPORTIONAL *
                        *   * SPACING.             *
                        *   ************************
                        *
                        * PARTS ARE STANDARD TSC SERIAL PRINTER DRIVER
                        *
                        * SET UP ADDRESS AND DRIVER LENGTH
                        *
C500                            ORG   $C500     MUST START AT $C500
                        *
C500 0145                       FDB   ENDA-POPEN LENGTH OF DRIVER
                        *
                        * ENTRY VECTORS
                        *
C502 16  0000   POPEN   LBRA  OPEN      PRINTER INITIALIZE
C505 16  0035   PQUIT   LBRA  CLOSE     PRINTER TERMINATE
C508 16  0034   PCHAR   LBRA  PROCHR    PRINT CHARACTER
C50B 16  00A9   PCHEK   LBRA  CHECK     PRINTER READY CHECK
                        *
                        * SERIAL PRINTER DRIVER PILE CONTROL BLOCK
                        *
C50E E020       ACIA    FDB   $E020     DEFAULT PORT ADDRESS #2 HERE
C510 00         SIDE    FCB   0         INTERFACE SIDE VALUE
C511 00                 FCB   0         — RESERVED BYTE —
                        *
                        * SEE IF A SIDE IS SPECIFIED
                        *
C512 A6  8C FB  OPEN    LDA   SIDE,PCR
C515 2A  08             BPL   ARESET    IF POSITIVE NO SIDE SPECIFIED
C517 48                 ASLA
C518 48                 ASLA            MULTIPLY BY FOUR
C519 AB  8C F3          ADDA  A IA+1,PCR
C51C A7  8C F0          STA   ACIA+1,PCR STORE INTO DEVICE ADDRESS
                        *
                        * RESET ACIA DEVICE
                        *
C51F AE  8C EC  ARESET  LDX   ACIA,PCR  GET ACIA ADDRESS
C522 86  03             LDA   #%00000011
C524 A7  84             STA   0,X       DO MASTER RESET ON ACIA
C526 86  11             LDA   #%00010001
C528 A7  84             STA   0,X       SET UP NO PARITY BIT,
C52A 6D  01             TST   1,X       8 DATA BITS, 2 STOP BITS
                        *
```

```
                        * SEND OUT CODES TO  SET CARRIER
                        * SPACING PITCH AMOUNT 10/120 INCHES
                        * CODE IS (ESC X I 0)
                        *
C32C 86 1B                    LDA   #$1B      ESC
C32E BD 6B                    BSR   PUT
C330 86 45                    LDA   #$45      "E"
C332 BD 67                    BSR   PUT
C334 86 31                    LDA   #$31      "1"
C336 BD 63                    BSR   PUT
C338 86 30                    LDA   #$30      "0"
C33A BD 5F                    BSR   PUT
C33C 39                       RTS
                        *
                        * CLOSE DOWN PRINTER PROCESSING
                        *
C33D 86 00              CLOSE LDA   #$00      SEND OUT CARRIAGE RETURN
                        *
                        * PRINT CHARACTER (FIRST PROCESS LENGTH)
                        *
C33F 34 10              PROCHR PSHS  X        SAVE X AS IT IS USED LATER ON
C341 81 0A                     CMPA  #$0A     IF IT IS A LINE FEED
C343 27 64                     BEQ   PUTEX    DO AND EXIT
C345 81 0D                     CMPA  #$0D     IF IT IS A CARRIAGE RETURN
C347 27 64                     BEQ   CR       DO A SPECIAL ROUTINE
C349 81 20                     CMPA  #$20     IF IT IS A SPACE
C34B 27 5C                     BEQ   PUTEX    DO IT AND EXIT
C34D 81 1F                     CMPA  #$1F     SEE IF IT IS A CONTROL CODE
C34F 23 58                     BLS   PUTEX    IF SO DO IT AND EXIT
C351 A7 8D 0091                STA   ATEMP,PCR STORE THE CHARACTER ITSELF
C355 30 8D 0069                LEAX  CHRTAB,PCR CHARACTER POSITION IN TABLE
C359 A6 86                     LDA   A,X      WIDTH VALUE OF THE CHARACTER
C35B A7 8D 0085                STA   PREVAL,PCR STORE IT IN PRESENT VALUE
C35F 6D 8D 0080                TST   CRFLG,PCR SEE IF THERE WAS A CR BEFORE
C363 27 06                     BEQ   ITSCLR   IF NOT GO ON TO REGULAR
C365 6F 8D 00DA                CLR   CRFLG,PCR IF SO CLEAR ONLY AFFECTS ONCE
C369 20 04                     BRA   OUTCHR   OUTPUT NOT ADDING PREVIOUS
C36B AB 8D 0006         ITSCLR ADDA  LSTVAL,PCR ADD WIDTH OF PRESENT TO LAST
C36F 8A 40              OUTCHR ORA   #$40      OR IN $40 AS PRINTER REQUIRES
C371 A7 8D 00CD                STA   MOVAL,PCR THIS IS OUR NEW MOVE VALUE
                        * HERE WE SEND OUT THE CODES FOR MOVE
                        * THE CODE IS 'ESC H (n1) (n2) (n3).
                        * NOTE n1,n2,n3 ARE GIVEN IN SPECIAL CODE NOT ASCII
C375 86 1B                    LDA   #$1B      ESC
C377 BD 22                    BSR   PUT
C379 86 48                    LDA   #$48      "H"
C37B BD 1E                    BSR   PUT
C37D 86 40                    LDA   #$40      "@" MEANS SMALL FORWARD MOV.
C37F BD 1A                    BSR   PUT
C381 86 40                    LDA   #$40      "@" CHARACTERS ARE 4= 96/120
C383 BD 16                    BSR   PUT
C385 A6 8D 0089               LDA   MOVAL,PCR ACTUAL AMOUNT TO MOVE (2= 16)
C389 BD 10                    BSR   PUT
C38B A6 8D 0087               LDA   ATEMP,PCR AFTER MOVING STRIKE CHARACTER
C38F BD 0A                    BSR   PUT
                        * IF YOU JUMP TO PUT TWICE YOU CAN STRIKE THE
                        * CHARACTER TWICE FOR DARKER PRINTING!!
C391 A6 8D 00AF               LDA   PREVAL,PCR MAKE PRESENT VALUE
C395 A7 8D 00AC               STA   LSTVAL,PCR LAST VALUE
C399 20 0C                    BRA   MTS
                        *
                        * WRITE A CHARACTER TO PRINTER (CODES ALSO)
                        *
C39B BD 1A              PUT   BSR   CHECK     WAIT FOR PRINTER READY
C39D 2A FC                    BPL   PUT       
C39F 34 10                    PSHS  X
C3A1 AE 8D FF69               LDX   ACIA,PCR  GET ACIA ADDRESS
C3A5 A7 01                    STA   1,X       STORE INTO DATA REGISTER
C3A7 35 90              MTS   PULS  X,PC
                        *
C3A9 BD 9B              PUTCO BSR   PUT       PUT THE CHARACTER AS IS
C3AB 20 FA                    BRA   MTS
                        *
C3AD BD 9B              CR    BSR   PUT       PUT OUT THE CARRIAGE RETURN
C3AF 86 FF                    LDA   #$FF
C3B1 A7 8D 00B1               STA   CRFLG,PCR SET CR FLAG AT NON-ZERO
C3B5 20 F0                    BRA   MTS
                        *
                        * CHECK TO SEE IF PRINTER IS READY
                        *
C3B7 34 04              CHECK PSHS  B
C3B9 E6 90 FF51               LDB   [ACIA,PCR] GET ACIA STATUS
C3BD 56                       RORB
C3BE 56                       RORB            SHIFT READY BIT
C3BF 56                       RORB            INTO SIGN FLAG
C3C0 35 84                    PULS  B,PC
                        *
                        * TABLE OF WIDTH VALUES TO USE
                        * ACTUALLY HALF THE VALUE TO BE
                        * MOVED AS IT MOVES THIS AMOUNT
                        * PRINTS THE CHARACTER AND THEN
                        * MOVES THIS AMOUNT AGAIN.
                        * EXPRESSED IN UNITS OF 1/120 INCH
                        *
                        * TABLE GOES FROM $00 TO $7F
                        *
C3C2 00 00 00 00 00 CHRTAB FCB   0,0,0,0
C3C6 00 00 00 00 00        FCB   0,0,0,0
C3CA 00 00 00 00 00        FCB   0,0,0,0
C3CE 00 00 00 00 00        FCB   0,0,0,0
C3D2 00 00 00 00 00        FCB   0,0,0,0
C3D6 00 00 00 00 00        FCB   0,0,0,0
C3DA 00 00 00 00 00        FCB   0,0,0,0
C3DE 00 00 00 00 00        FCB   0,0,0,0
C3E2 05 05 05 05 05        FCB   5,5,5,5   SP TO #
C3E6 05 06 06 04           FCB   5,6,6,4   $ TO '
C3EA 05 05 05 05           FCB   5,5,5,5   ( TO +
C3EE 05 05 05 05           FCB   5,5,5,5   "," TO /
C3F2 05 05 05 05           FCB   5,5,5,5   0 TO 3
C3F6 05 05 05 05           FCB   5,5,5,5   4 TO 7
C3FA 05 05 05 05           FCB   5,5,5,5   8 TO ;
C3FE 05 06 05 05           FCB   5,6,5,5   < TO ?
C402 07 07 06 06           FCB   7,7,6,6   @ TO C
C406 06 05 05 06           FCB   6,5,5,6   D TO O
C40A 06 04 05 06           FCB   6,4,5,6   H TO K
C40E 06 07 06 06           FCB   6,7,6,6   L TO O
C412 05 06 06 06           FCB   5,6,6,6   P TO S
C416 06 06 06 07           FCB   6,6,6,7   T TO W
C41A 06 06 06 05           FCB   6,6,6,5   X TO '
C41E 06 05 06 05           FCB   6,5,6,5   ??? VARIES WITH PRINT WHEEL
C422 05 05 05 05           FCB   5,5,5,5   ' TO c
C426 04 04 05 04           FCB   4,4,5,4   d TO g
C42A 05 05 04 05           FCB   5,5,4,5   h TO k
C42E 05 06 05 05           FCB   5,6,5,5   l TO o
C432 05 05 04 04           FCB   5,5,4,4   p TO s
C436 04 05 05 07           FCB   4,5,5,7   t TO w
C43A 05 05 05 05           FCB   5,5,5,5   x TO ?
C43E 05 05 06 00           FCB   5,5,6,0   ??? VARIES WITH PRINT WHEEL
C442 00                 MOVAL FCB   0         MOVE VALUE
C443 FF                 CRFLG FCB   $FF       CARRIAGE RETURN FLAG
C444 00                 PREVAL FCB  0         PRESENT VALUE
C445 00                 LSTVAL FCB  0         LAST VALUE
C446                    ATEMP RMB   1         TEMPORARY CHARACTER STORAGE
C447                    ENDS  EQU   *         END OF DRIVER
                              END

0 ERROR(S) DETECTED

SYMBOL TABLE:

ACIA  C308  ARRENT C31F  ATEMP  C446  CHECK C387  CHRTAB C3C2
CLOSE C33D  CR     C3AD  CRFLG  C443  ENDS  C447  ITSCLR C36B
LSTVAL C445 MOVAL  C442  OPEN   C312  OUTCHR C36F  PCRHAR C308
PCR0X C30B  POPEN  C302  PQUIT C305  PREVAL C444  PROCHR C33F
PUT   C39B  PUTEX  C3A9  RTS    C3A7  SIDE  C310
```

December 3, 1981

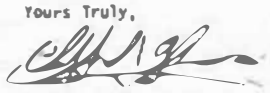
68 MICRO Journal
5900 Cassandra Smith
Computer Publishing Center
P.O. Box 849
Hixson, Tennessee 37343

Gentlemen:

I know that the SWTPC users are deep into some heavy computing so that they are not normally attracted to such foolishness as computer games. But I have found that it is always handy to have something to show the visiting kids when they want to know what a computer is all about.

Here is a cute little program to have man and monster battle it out in an eternal (read infinite loop) struggle. It also invites the user to create his own designs by changing the DATA statements starting with line 14900. The program may be terminated by a control-C.

Yours Truly,



Clifford Glennon
3395 Nostrand Ave. Apt 2G
Brooklyn, New York 11229
Phone: 212-934-2439

```
100 REM     Man VS Monster
200 REM
300 REM     By Cliff Glennon, Brooklyn New York, December 1981
400 REM
500 REM     A graphics game written in TSC's Extended Basic©
                              for the SWTPC CT-82© terminal.
600 REM
700 REM     TSC is the trademark of Technical Systems Consultants, Inc.
800 REM                          P.O. Box 2570, West Lafayette, Ind. 47906
900 REM     SWTPC and CT-82 are trademarks of Southwest Technical Products Corp.
1000 REM                         219 W. Rhapsody, San Antonio, Texas 78216
1100 REM
1200 REM     WHEN A CONTROL-C IS RECEIVED EXIT THE PROGRAM VIA LINE 18500
1300 ON ERROR GOTO 18500
1400 REM SCALE 0: DISABLE SCALE, A FEATURE WHICH ELIMINATES ROUNDING ERRORS
1500 DIM MAN(30,10),MON(10,10),BOM(10,10):REM MAN, MONSTER, BOOM
1600 REM     THE "%" INDICATES AN INTEGER VARIABLE
1700 REM
1800 REM     SEED THE RANDOM FUNCTION
1900 INPUT "What is your lucky number today, Sir";S
2000 LET S=RND(-S)
2100 REM
2200 REM     DEFINE RANDOM FUNCTIONS
2300 DEF FNA(A)= INT(137*RND(0)+1):REM 183-10 PIXELS PER LINE
2400 DEF FNB(B)= INT(56*RND(0)+1: REM 66-10 ROWS OF PIXELS
2500 DEF FNC(C)= INT(100*RND(0)+1):REM BATTLE OUTCOME
2600 REM
2700 REM     CONFIGURE TERMINAL FOR GRAPHICS MODE
2800 PRINT CHR$(29);CHR$(22);
2900 REM
3000 REM     READ MAN FIGURE INTO MEMORY
3100 FOR I%= 1 TO 10
3200         FOR J%= 1 TO 10
3300                 READ MAN(J%,I%)
3400         NEXT J%
3500 NEXT I%
3600 REM
3700 REM     READ MONSTER FIGURE INTO MEMORY
3800 FOR I%= 1 TO 10
3900         FOR J%= 1 TO 10
4000                 READ MON(J%,I%)
4100         NEXT J%
4200 NEXT I%
4300 REM
```

```
4400 REM     READ BOOM INTO MEMORY
4500 FOR I%= 1 TO 10
4600         FOR J%= 1 TO 10
4700                 READ BO%(J%,I%)
4800         NEXT J%
4900 NEXT I%
5000 REM
5100 REM     TURN OFF BLINKING CURSOR
5200 PRINT CHR$(5);
5300 REM
5400 REM     SET SCORES MAN=SO%, MACHINE=S1%
5500 LET SO%=0:S1%=0
5600 REM
5700 REM     ***** START LOOP *****
5800 REM
5900 REM     HOME UP CURSOR AND CLEAR SCREEN
6000 PRINT CHR$(126);CHR$(22);
6100 REM
6200 REM     PRINT SCORE
6300 PRINT CHR$(28);CHR$(11);CHR$(0);CHR$(30);:REM POINT TO TOP OF SCREEN
6400 PRINT "MAN >";SO%;"        MONSTER >";S1%;
6500 REM
6600 REM      GET MAN'S POSITION
6700 LET A%= FNA(A): B%= FNB(B)
6800 REM
6900 REM     GET MONSTER'S POSITION
7000 LET C%= FNA(A): D%= FNB(B)
7100 REM
7200 REM     PRINT MAN AND MONSTER IN RANDOM ORDER
7300 IF FNC(C) < SO THEN GOSUB 9400 ELSE GOSUB 9700
7400 REM
7500 REM     ZZZAP
7600 FOR I%= 1 TO 5
7700         GOSUB 13800:REM FIRE
7800         GOSUB 14200:REM RELOAD
7900 NEXT I%
8000 REM
8100 REM     DETERMINE WHO WINS
82   IF FNC(C) < SO THEN GOTO 8900
8300 REM
8400 REM     MAN WINS
8500 LET SO%=SO%+1
8600 LET E%=C%:F%=D%:REM MONSTER CO-ORDINATES
8700 GOSUB 12000:REM GO BOOM
8800 GOTO 5700
8900 REM     MONSTER WINS
9000 LET S1%=S1%+1
9100 LET E%=A%:F%=B%:REM MAN'S CO-ORDINATES
9200 GOSUB 12000:REM GO BYE-BYE
9300 GOTO 5700
9400 REM     PRINT MAN FIRST
9500 GOSUB 10000:REM PRINT MAN
9600 GOTO 11000: REM PRINT MONSTER AND RETURN
9700 REM     PRINT MONSTER FIRST
9800 GOSUB 11000: REM PRINT MONSTER FIRST
9900 GOTO 10000:  R M PRINT MAN AND RETURN
10000 REM     PRINT MAN
10100 REM
10200 LET E%=A%:F%=B%
10300 FOR I%= 1 TO 10
10 00         FOR J%= 1 TO 10
10500                 IF MA%(J%,I%) = 1 THEN GOSUB 13000:REM PRINT DOT
10600         NEXT J%
10700 NEXT I%
10800 RETURN
10900 REM
11000 REM     PRINT MONSTER
11100 REM
11200 LET E%=C%:F%=D%
11300 FOR I%= 1 TO 10
11400         FOR J%= 1 TO 10
11500                 IF MO%(J%,I%) = 1 THEN GOSUB 13000:REM PRINT DOT
11600         NEXT J%
11700 NEXT I%
11800 RETURN
11900 REM
12000 REM     PRINT BOOM
12100 REM
12200 FOR I%= 1 TO 10
12300         FOR J%= 1 TO 10
12400                 IF BO%(J%,I%) = 1 THEN GOSUB 13000 ELSE GOSUB 13400
12500                 REM   PRINT DOT ELSE ERASE DOT
12600         NEXT J%
12700 NEXT I%
12800 RETURN
12900 REM
13000 REM     SET DOT
13100 REM
13200 PRINT CHR$(29);CHR$(191);CHR$( E%+J%);CHR$(F%+I%);:RETURN
13300 REM
13400 REM     CLEAR DOT
13500 REM
13600 PRINT CHR$(29);CHR$(20);CHR$(E%+J%);CHR$(F%+I%);:RETURN
13700 REM
13800 REM     DRAW LINE
13900 REM
14000 PRINT
CHR$(29);CHR$(3);CHR$(A%+5);CHR$(B%+5I;CHR$(C)+5I;CHR$(D%+5);:RETURN
14100 REM
14200 REM     ERASE LINE
14300 REM
14400 PRINT
CHR$(29);CHR$(4);CHR$(A%+5);CHR$(B%+5I;CHR$(C%+5I;CHR$(D%+5);:RETURN
14500 REM
14600 REM
14700 REM     MAN
14800 REM
14900 DATA 0,0,0,0,1,1,0,0,0,0
15000 DATA 0,0,0,0,0,1,1,0,0,0
15100 DATA 0,0,0,0,1,1,0,0,0,0
15200 DATA 0,0,0,0,0,1,0,0,0,0
15300 DATA 0,1,1,1,1,1,1,1,1,0
15400 DATA 0,1,0,1,1,1,0,0,1,0
15500 DATA 0,1,1,0,1,1,0,0,1,0
15600 DATA 0,0,0,1,0,1,0,0,1,0
15700 DATA 0,0,0,1,0,1,0,0,0,0
15800 DATA 0,0,1,1,0,1,0,0,0,0
15900 REM
16000 REM     MONSTER
16100 REM
16200 DATA 0,1,0,0,0,0,0,0,1,0
16300 DATA 1,0,0,0,0,0,0,0,0,1
16400 DATA 0,1,0,0,0,0,0,0,1,0
16500 DATA 0,1,1,1,1,1,1,1,1,0
16600 DATA 1,1,0,1,1,1,1,0,1,1
16700 DATA 1,1,0,0,1,1,0,0,1,1
16800 DATA 0,1,1,1,1,1,1,1,1,0
16900 DATA 0,0,0,1,0,0,1,0,0,0
17000 DATA 0,0,0,1,0,0,1,0,0,0
17100 DATA 1,1,1,1,0,0,1,1,1,1
17200 REM
17300 REM     BOOM
17400 REM
17500 DATA 1,0,0,0,0,0,0,0,0,1
17600 DATA 0,1,0,0,1,1,0,0,1,0
17700 DATA 0,0,1,0,0,0,0,1,0,0
17800 DATA 1,0,0,1,1,1,1,0,0,1
17900 DATA 0,0,0,1,0,0,1,0,0,0
18000 DATA 0,0,0,1,0,0,1,0,0,0
18100 DATA 1,0,0,1,1,1,1,0,0,1
18200 DATA 0,0,1,0,0,0,0,1,0,0
18300 DATA 0,1,0,0,1,1,0,0,1,0
18400 DATA 1,0,0,0,0,0,0,0,0,1
18500 REM     CONFIGURE TERMINAL FOR NORMAL OPERATION
18600 PRINT CHR$(28);CHR$(17);
18700 REM     TURN CURSOR ON
18800 PRINT CHR$(21);
18900 PRINT "ERROR--";ERR;"    ON LINE--";ERL
19000 END
```

68 MICRO JOURNAL DEC. 15,1981.

HELP

WE WORK AS INSTRUCTORS AT THE TRANSPORT CANADA TRAINING INSTITUTE IN CORNWALL,ONTARIO,CANADA.

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D. R. Wheeler

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With the proliferation of computer magazines and personal computers, with the growing demand for soft ware and hard ware, and with the increasing numbers of people "getting into" micros, it is time for a publication which will organize the mass of information which passes before us — not yearly, not quarterly, but monthly — so that the news is fresh and immediately usable. Just the annual December issue, which lists the entire year's articles, will be a best-seller.

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68 Kelly Road
So. Windsor, CT
06074

Dear Editor:

I am constantly reading reviews on the APF Imagination Machine. They all echo the same theme "Lacks Software".

I've been producing programs for this machine for quite some-time. However, with the limited number of machines in use, a national advertisement would be prohibitive.

Would you publish my address so that other APF users may write for a list of available programs.

Sincerely
Robert Eisman

1901 Silverside Rd Wilmington, DE 19810

13 December, 1981

Dear Don Williams,Sr., Just a short note to comment on a great experience with one of your regular advertisers, Thomas Instrumentation of Avalon, NJ. I called Thomas Instrumentation with a SWTPC D-5 drive problem and to my amazement, TI agreed to fix it while I waited. The service took 4 hours and was tedious. Thomas Instrumentation none the less persisted! My thanks to TI and to you for carrying them as a sponsor.

Yours truly,
Vincent M. Finelli

HELP

Would like information on how to run one 5" drive on SWTPC DMAF-1 Controller card (in addition to the two 8" already on-line). Has anyone been successful in doing this? Will pay reasonable postage and other fees for anyone willing to share their info. Would like to purchase one DC-1 controller card and one SHUGART SA400 drive (5" drive). Also need 2 ea SWTPC MP-S cards for SS-30. Please note we are Domestic Zone 8, 20 cents for letters , etc. George Kelm, P O Box 160, Yap, Caroline Is. TT 96943

***

Where may I obtain a 6800 Morse Code program? H. C. Fields. 4116 Morgan Circle, Ft Worth TX 76118, (817) 498-2785.

***

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***

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***

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***

(1) SWTPC 6800-2 with 28K, MPC, MPS, MPL, JPC clock, 4800 Baud JPC, CT-64 with SWTPC Monitor, SWTBUG, PR-40 Printer, much software. $700 or best offer. Glenn (703) 547-3051.

***

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***

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***

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***

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- —Using your computer as a general-purpose 300-baud terminal
- —Downloading programs from other computers

The Microtext module is a program pack containing not only hrmware but a second serial port so that both your printer and modem can be connected at the same time. Microtext can be configured for any serial printer that will work with the Color Computer, even if it requires line feeds! But even if you don't have a printer, you can keep a permanent copy of your data by storing to cassette tape. Also, any Radio Shack/Centronics-compatible parallel printer may be used by adding the Micro Works' PI80C parallel interface.

For those of you with special terminal applications, Microtext has selectable parity; it sends odd, even, mark or space. With mark parity (which is default) you can send to computers requiring either seven or eight bits. All 128 ASCII codes can be sent. Exchange programs with other Color Computer users! Basic programs may be downloaded from other computers or timesharing systems.

You'll find many uses for this versatile module! Available in ROMPACK, ready-to-use, for $59.95.

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG Tape Price: $29.95**

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pak I. **CBUG ROM Price: $39.95**

SOURCE GENERATOR: This package is a disassembler which runs on the color computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler Price: $49.95**

LEARN 6809!

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, contains the most comprehensive reference material available for programming your Color Computer. **Price: $16.95**

HARDWARE

PARALLEL O!

USE A PARALLEL PRINTER with your Color Computer! Adaptor box plugs into the serial port and allows use of Centronics/Radio Shack-compatible printers with parallel interface. Assembled and tested. **PI80C Price: $69.96**

ROMLESS PAK I — is an empty program pack capable of holding two 2716 or 2732 EPROMS, allowing you up to 8K of program! The PC board inside comes with sockets installed, ready to go with the addition of your custom EPROMs. **Price: $24.95**

32K RAM!

MEMORY UPGRADE KITS: Consisting of 4116 200ns. integrated circuits, with instructions for installation. **4K-16K Kit Price: $39.95. 16K-32K Kit** (requires soldering experience) **Price: $39.95**

SPARE PARTS — SAMs, 6809Es, RAMs, PIAs. Call for prices.

GAMES

Pak Attack — Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **Price: $24.95**

Star Blaster — Blast your way through an asteroid field in this action-packed Hi-Res graphics game! Available in ROMPACK, requires 16K. **Price: $39.95**

Berserk — Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **Price: $24.95**

Adventure — *Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **Price: $19.95** each.

THE MICRO WORKS

GOOD STUFF!

MasterCharge/Visa Accepted
California residents add 6% tax

P.O. BOX 1110, DEL MAR, CA 92014 (714) 942-2400

ALFORD AND ASSOCIATES — GOOD NEWS!

COLOR COMPUTER TALKS!

Alford & Associates is now shipping its SP-1 "SPEAKER PACK" for the Radio Shack Color Computer. The SP-1 plugs directly into the EXB-Pack slot, and its use requires no wiring, computer modification or electronics knowledge!

The software provided gives your computer the power of speech using nothing more than Basic Peek and Poke statements! The SP-1 can add a new dimension to your games, business programs or CAI drills. Just about any application can benefit from the SP-1!

The SP-1 allows unlimited speech. Also, the SP-1 requires less memory overhead for speech than any other type of unlimited voice synthesizer on the market today. Typically, fewer bytes of storage are needed than the equivalent number of letters in English Text! Basic data statements suffice to store most any text you want! Also, no machine language routines are needed to drive it!

The SP-1 comes with sample software in Basic to demonstrate the power of this fantastic device. Alford's even supplies a version of their VOX-EDITOR to allow users who have 16K of memory to edit speech files quickly and easily (Extended Basic is NOT required)!

The SP-1 includes a comprehensive manual which provides speech theory, use of the included software, phoneme code charts, sample programs and much more!

COMPUTERS SPEAK TEXT!

Alford's has been on the lookout for a good speech converter program for use with their SP-1 and VS-1 speech synthesizers, and report having finally found it! The program takes English text in ASCII form, converts it, and then directly drives the synthesizer! By sending the appropriate control codes, you can even switch between text conversion or spelling letters or spelling straight phoneme information!

The standard version is designed to work just like OUTCH or OUTEE. In all modes, you call the converter with characters in the A-REGISTER. In conversion mode, characters are accumulated until a word is complete, then it is converted and spoken. In letter mode each character is treated as an ASCII character and pronounced. In phoneme mode, each character is treated as a single inflected phoneme code.

The Color Computer version is even easier to use. Once loaded, Basic has a new verb -- SAY. To use the converter, you simply use the command to make the computer talk; i.e., SAY "THIS IS A COMPUTER SPEECH TEST", and the Color Computer will!

TREK-69, COLOR-TREK

Ever since Alford's introduced TREK-68 last year, we've been asking them to do a version for 6800 users and for the new TRS-80 Color Computer. They said that they could have, but their old home-brew computer and a bright shiny store-bought one might not have been compatible. Rather than take a chance, they held off until they decided on which systems they wanted to buy. Well, they finally decided, and at last, our wishes have come true!

If you have a MEMORY-MAPPED DISPLAY then TREK-68 or TREK-69 are for you. If you have a color computer with 16K memory (Extended Bc ic not required), then you should ask for COLOR-TREK.

They took the classic trek-game and rewrote it completely in assembly code, making it run in REAL-TIME. The result is, we feel, the finest TREK game available!

Sooty deatro era chase you even as you move about the Quadrant. Their multiple battle pleas make them hard to evade! You dodge torpedoes and return fire. Damage is maintained and repairs occur as you play. Messages flash on and off. Again, all in REAL TIME!

Game difficulty levels run from SIMPLE (for beginners) to a level which, to our knowledge, only one person other than the author himself has succeeded in winning! This is not a simple game. The best winning time recorded for the awful SUICIDE OPTION is twenty-nine minutes. The fastest loss we have seen occurred in only eleven seconds!

Have a MEMORY-MAPPED DISPLAY? Then all we can ask is, why haven't you TREK-ed?!

SPEAKER BARE BOARDS!

Alford and Associates recently lowered the price on its VS-1 synthesizer. A company spokesman stated that the reduction was due to the great response that the TRS-80 community has given the board. Now they are going one step further. You can now buy a bare board, manual, disk or synthesizer chip seperately. See the price list for details.

NEW SCREEN EDITOR!!

Does your terminal have an addressable cursor like the Soroc IQ-120? Does your terminal scroll when you do a new line on the bottom line? Does your terminal run full-duplex? If not, then you should skip this ad. Otherwise, you may be ready for SCREDITOR III!

How could you like an editor that will handle a 252-column spread sheet? Or one that allows you to move margins anywhere and at any time? Or that handles true multi-column edit jobs like this page? Or that formats text as you type? Or that allows you to set or clear tabs at any time, anywhere, with a single keystroke? SCREDITOR III CAN!

Like to be able to define what single-key operations you do with what single keys? Or for that matter, what command names you want to give the commands? YOU CAN WITH SCREDITOR III!

Wouldn't it be nice to be able to define up to twenty-six editing macros, with a macro length of up to 1000 characters? Or to be able to mix commands, operations and text, all in the same macro? Or even to display and edit the macros themselves just like text? Or save and load your macros from disk files? YOU CAN WITH SCREDITOR III!

How about file handling. Would you like to edit unlimited-sized files? Or to be able to read selected lines out of one file into another? Or how about conditional previewed reading to let you see the lines before inserting them? Or be able to write lines out to new files? Or to specify where to start reading or writing, and how much at a time, and how many times? YOU CAN WITH SCREDITOR III!

Think about it. Thirty-two control-code operations. About fifty other commands, and the number is growing. Twelve justification commands almost ONLY with THE ALL-NEW SCREDITOR III.

As if all of this, and much more than we have room for here, isn't enough, this new editor is available for FLEX 1.0, FLEX 2.0, FLEX-9, DOS68 and DOS69! OS-9 versions to be available soon (maybe as you read this, even!).

In talking to John Alford, proprietor of Alford and Associates, we were told that he is tired of writing editors. He indicates that he knows only two ways to stop; get out of the business, or write the ultimate editor. It doesn't appear that he is going out of business soon!

If this hasn't convinced you that you should be using SCREDITOR III, then call or write for more details, or for the complete SCREDITOR III spec sheet. Our only question is, why continue to edit, when you can SCREDIT?

SCREDITOR III is available for most serial terminals, and all memory-mapped displays. 6800 and 6809 versions are ready now!

SSB DOS UTILITIES

As many of you know, Smoke Signal Broadcasting's DOS is one of the best around. There was, however, one thing we felt to be lacking...disk names!

Alford and Associates has finally found how to go about naming a disk in a non-destructive and secure way, and started to write some utilities using the disk information record. Their NAME utility allows you to name your disks. The information sector includes the disk name, serial number, creation date, last update date, a comment field, and last but not least, a disk file access code.

The access code led them to the second program, LOCK. With this program you can write, delete, and LIST LOCK your files!

With their LIST program, the list-locked files do not list unless you give the access code for the disk! In addition, you do not have to look at a pile of transient commands unless you elect to, as LIST allows you to option the listing for certain files. LIST even lets you list the disk information record!

The UPDATE program lets you change the information records. They also include PURGE to clean up disks, DUMP to make pretty core images, and TITLE to print title pages on all of your listings.

The UTILITIES ol disk is available for DOS68, versions 4.0 and up, and for all versions of DOS69. The manual itself is a good reason for buying this package, as it has a batch of information on SSB disk structure.

PRICE LIST

SP-1 SPEAKER-PACK, COMPLETE . .	$179.95
SP-1 MANUAL ONLY	19.95
VS-1 SPEAKER, COMPLETE	$189.95
VS-1 BARE BOARD ONLY	19.95
VS-1 MANUAL ONLY	19.95
VS-1 VOX-EDIT PROGRAM DISK ONLY	24.95
VS-1 MANUAL, BOARD, CHIP, DISK	100.95
VS-1 ASSEMBLED, LESS SC-01 . .	129.95
SC-01A SYNTHESIZER CHIP	65.00
SC-1/6400 SPEECH TRANSLATOR . .	$29.95
SC-1/6809 SPEECH TRANSLATOR . .	29.95
SC-1/COLOR SPEECH TRANSLATOR .	19.95
TREK-68 DISK, MANUAL	$24.95
TREK-69 DISK, MANUAL	24.95
COLOR-TREK CASSETTE, MANUAL . .	14.95
MANUAL ONLY, ANY OF ABOVE . . .	5.95
SSB DOS UTILITIES ol DISK . . .	$24.95
SCREDITOR III/6809 DISK, MANUAL	$89.95
SCREDITOR III/6800 DISK, MANUAL	89.95
SCREDITOR III MANUAL ONLY . . .	24.95

PRICE OF MANUAL REFUNDABLE ON ANY ORDER. PRICES SUBJECT TO CHANGE WITHOUT NOTICE. BE SURE TO SPECIFY DISK SIZE, OPERATING SYSTEM AND PROCESSOR TYPE WHEN ORDERING.

THE LAST WORD...

This year (our third) has been the most successful ever. I would like to take this opportunity to thank our many fine customers for their support and encouragement.

Most of all though, I would like to express my thanks to God, who is the major "Associate" in my business. At this time of year it seems especially appropriate to pause to give thanks and to remember the many miracles which He has performed for all of us. Too often, we take His grace for granted.

In this season, we celebrate the miracle of the eternal light and the miracle of the birth of the Messiah, both stand for hope for the human race. Both stand for God's light in our life. And both show His love for us, in that He provides for our needs in many ways, especially in times of darkness.

I pray that in this next year, my walk with Him will lead me closer to the place He wants me, and that I might become even better able to serve every one of you, my customers. I also hope that each one of you will pray for me and my family so that we might grow as He wants us to, and that we might be more worthy of your patronage.

Thank you again, in love and in prayer, from all of us, and especially from....

John L. Alford (proprietor)
Sally Anne Alford (most everything else)
Alford and Associates

GENERAL INFO

All of Alford's software is available on 5- or 8-inch disk except where noted. Also, except where noted, all software is available for FLEX 1.0, FLEX 2.0, FLEX-9, DOS68 or DOS69. Versions for OS-9 are coming soon. Software orders are normally shipped within three days. Hardware runs from stock to 30 days.

You should add $5 for shipping on any order under $100. Alford's pays shipping over $100. Overseas orders, add $10 for air mail delivery. Virginia residents add 4% sales tax. Any order received without shipping or tax (where applicable) will be returned unfilled. Unless you specify otherwise, shipping is by UPS in the U.S.

Alford's accepts Mastercard, Visa, COD's or checks in U.S. funds. Open account orders by prior arrangement only. Personal checks may delay shipping by two or three weeks.

Flex is a trademark of Technical Systems Consultants. TRS-80 and Color Computer are trademarks of the Tandy Corporation. OS-9 is a trademark of Microware Systems Corporation.

Most people don't realize it, but the total national debt in this country is just now passing one trillion dollars. Today's economists tell us that this is why we have inflation. What they don't tell you is that the total debt is the private sector is over nine trillion dollars! T[illegible] -ernment on the private [illegible] is it approximately [illegible]

RICHMOND (AP). Today, 45 year old Harley S. Rumquat was observed biting a squirrel dog in Monroe Park. When asked by this reporter what provoked such a singular activity, Harley replied that he had been coming to the park daily for fifteen years, and that on each and every outing, the dog had bitten him. At last he could stand it no longer, and [illegible]

FORGY BUTTUM, AR -- This reporter has Previously of the opinion that he had seen everything, but found that there is truly something new under the sun, as the honorable Senator Silas Pump was caught in the very act of telling the truth to his constituents.

This queried about his uncommon [illegible] the senator [illegible] that he did

Software piracy costs each of us. Most people don't realize that the reason that much of the available software costs what it does simply because the writer has to increase the price of his product to make up for the lost sales which result from people who think they are doing a good deed for a friend. A [illegible] to that

ELEKTRA COMPUTER PRODUCTS

ELEKTRA CABINET

Made of heavyweight 0.090" thick aluminum.
Interior Size: 18-1/2" wide by 21-7/8" deep x 6-3/4" high
Heavy duty A.C. line cord.
A.C. fuse holder
EMI filter
Fan with optional filter
Back panel has 10 cutouts for "D" type data connectors
Front panel has key on/off power switch, 2 illuminated push buttons (Reset and NMI/Abort), and 2 cutouts for 5-1/4" floppy drives.

Without power supply:	$250.00
With 110v power supply, disk regulator board or two filler plates:	$450.00
With 220v power supply, disk regulator board or two filler plates:	$500.00

POWER SUPPLY

Highest quality linear power supply conservatively rated at 15a @ 8v, 3a @ 16v, 3a @ -16v
3 primary inputs to adjust for light, medium, and heavy loading

110v version: $175.00 **220v version: $225.00**

DISK REGULATOR BOARD with cables

Powers 2 5-1/4" floppy drives: $50

Fitter (fan): $10.00

ELEKTRA CPU 8/9

Choice of 6808 or 6809 CPU
(6808 is software compatible with the 6800 at the opcode level)

DEVICE		6809 ADDRESS	6808 ADDRESS
3 2716 Eproms	Eprom #3	F800-FFFF	F800-F7FF and E000-E7FF
	Eprom #2	F000-F7FF	F000-F7FF
	Eprom #1	E800-EFFF	E800-EFFF
1K Scratchpad RAM		E400-E7FF	A400-A7FF and A000-A3FF
MC6840 Triple Timer		E210-E217	8210-8217

MC14411 Baud Rate Generator producing baud rates of:
Low Range 110, 150, 300, 600, 1200, 4800, and 9600
High Range 440, 600, 1200, 2400, 4800, 19200, and 38400
The board does not contain a DAT and does not support extended addressing.
The board supports DMA by either HALT or BUSREQ when a 6809 CPU is used.
DMA to the devices on the CPU card is not supported.
The board will run any of the MIKBUG™ compatible monitors in the 6808 mode and SBUG-E, MUMBUG (Special Version), and GIMIBUG-09 in the 6809 mode. The ELECTRA CPU 8/9 will run any of the GIMIX® disk controller boards with the appropriate GIMIX® version of FLEX™. A special version of OS-9™ L-1 is available.

Bare board: $50.00* **Kit: $225.00*** **Assembled: $275.00**

ELECTRA DPS Dual Port Serial Card

Fits the standard 30 pin SS-50 bus I/O slot
Can be configured for 4 addresses per port with the B port 2 addresses higher than the A port or for 16 addresses per port with the B port 4 addresses higher than the A port.
Each port is terminated at two 16 pin dip sockets, one socket configured for modem and the other socket configured for terminal or printer. RTS, CTS, DTR, DCD, DTR are appropriately implemented.
Each port has independent selection of baud rate.
Each port allows the interrupt request to be jumpered to the IRQ or FIRQ/NMI bus line.

Bare board: $20.00* **Kit: $60.00*** **Assembled: $80.00**

Assembled cable (two required for each interface board): $20.00 each

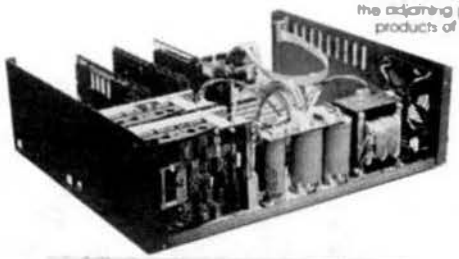
ELEKTRA DPP Dual Port Parallel Card

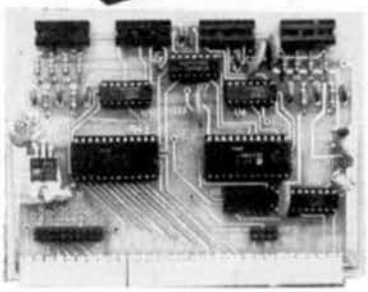
Fits the standard 30 pin SS-50 bus I/O slot.
Can be configured for 4 addresses per port or 16 addresses per port (occupying the first four addresses of the I/O slot).
The direction of the TTL buffers can be controlled by either on board jumper connectors or by a signal from the peripherals.
The interrupt request lines for each port may be individually jumpered to the IRQ or FIRQ/NMI bus line.

Bare board: $20.00* **Kit: $60.00*** **Assembled: $80.00**

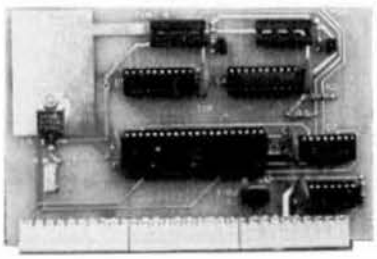
Assembled cable (two required for each interface board): $20.00 each

The CPU, 56K memory board, and DMA controller board in the adjoining picture are products of GIMIX Inc.





DPS Dual Port Serial



DPP Dual Port Parallel

*WARNING

AAA Chicago Computer Center does not provide repair or diagnostic service for customer assembled kits. AAA Chicago Computer Center does warranty and maintain service for our assembled boards. The customer should carefully take into consideration the small differential separating our kit and assembled prices when making his choice of purchase.

We have introduced our line of computer equipment with the purpose of offering the highest quality of components possible at affordable prices. For those of you whose needs dictate the state of the art in technology, we recommend the GIMIX line. When practical, our equipment is intended to be upward compatible to GIMIX equipment. We do not intend to offer a complete line of equipment and we recommend that you choose GIMIX components to round out your system.

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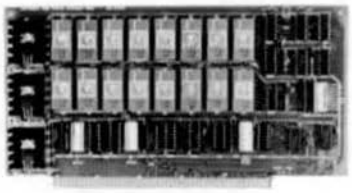
Phone consultation available most weekdays from 4 PM to 6 PM

DIGITAL RESEARCH COMPUTERS
(214) 271-3538

ALL SALES ARE MADE SUBJECT TO THE TERMS OF OUR 90 DAY LIMITED WARRANTY. A COPY OF THIS WARRANTY IS AVAILABLE FREE, ON REQUEST.

32K S-100 EPROM CARD
NEW!



$79.95 KIT

USES 2716's

Blank PC Board - $34

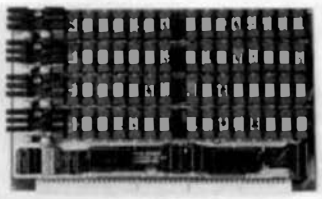
ASSEMBLED & TESTED ADD $30

SPECIAL: 2716 EPROM's (450 NS) Are $9.95 Ea. With Above Kit.

KIT FEATURES:
1. Uses +5V only 2716 (2K x 8) EPROM's.
2. Allows up to 32K of software on line!
3. IEEE S-100 Compatible.
4. Addressable as two independent 16K blocks.
5. Cromemco extended or Northstar bank select.
6. On board wait state circuitry if needed.
7. Any or all EPROM locations can be disabled.
8. Double sided PC board, solder-masked, silk-screened.
9. Gold plated contact fingers.
10. Unselected EPROM's automatically powered down for low power.
11. Fully buffered and bypassed.
12. Easy and quick to assemble.

32K SS-50 RAM

$259.95 KIT



For 2MHZ Add $10

Blank PC Board $50

For S TPC 6600 - 6609 Buss

Support IC's and Caps $19.95

Complete Socket Set $21.00

Fully Assembled, Tested, Burned In Add $30

At Last! An affordable 32K Static RAM with full 6809 Capability.

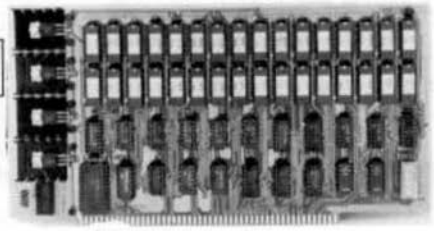
FEATURES:
1. Uses proven low power 2114 Static RAMS.
2. Supports SS50C - EXTENDED ADDRESSING.
3. All parts and sockets included.
4. Dip Switch address select as a 32K block.
5. Extended addressing can be disabled.
6. Works with all existing 6800 SS50 systems.
7. Fully bypassed. PC Board is double sided, plated thru, with silk screen.

16K STATIC RAM KIT-S 100 BUSS

PRICE CUT!

$149.95 KIT

FOR 4MHZ ADD $10



KIT FEATURES:
1. Addressable as four separate 4K Blocks.
2. ON BOARD BANK SELECT circuitry. (Cromemco Standard!). Allows up to 512K on line!
3. Uses 2114 (450NS) 4K Static Rams.
4. ON BOARD SELECTABLE WAIT STATES.
5. Double sided PC Board, with solder mask and silk screened layout. Gold plated contact fingers.
6. All address and data lines fully buffered.
7. Kit includes ALL parts and sockets.
8. PHANTOM is jumpered to PIN 67.
9. LOW POWER: under 1.5 amps TYPICAL from the +8 Volt Buss.
10. Blank PC Board can be populated as any multiple of 4K.

BLANK PC BOARD W/DATA-$33

LOW PROFILE SOCKET SET-$12

SUPPORT IC'S & CAPS-$19.95

ASSEMBLED & TESTED-ADD $35

OUR #1 SELLING RAM BOARD!

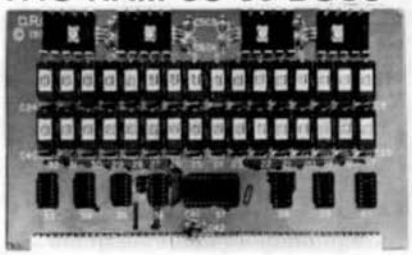
16K STATIC RAM SS-50 BUSS

PRICE CUT!

$139.95 KIT

FULLY STATIC!

FOR 2MHZ ADD $10



FOR SWTPC 6800 BUSS!

ASSEMBLED AND TESTED - $35

KIT FEATURES:
1. Addressable on 16K Boundaries.
2. Uses 2114 Static Ram.
3. Fully Bypassed.
4. Double sided PC Board. Solder mask and silk screened layout.
5. All Parts and Sockets included.
6. Low Power: Under 1.5 Amps Typical.

BLANK PC BOARD—$35 COMPLETE SOCKET SET—$12
SUPPORT IC'S AND CAPS—$19.95

NEW! **STEREO! S-100 SOUND COMPUTER BOARD** NEW!

At last, an S-100 Board that unleashes the full power of two unbelievable General Instruments AY3-8910 NMOS computer sound IC's. Allows you under total computer control to generate an infinite number of special sound effects for games or any other program. Sounds can be called in BASIC, ASSEMBLY LANGUAGE, etc.

KIT FEATURES:
- TWO GI SOUND COMPUTER IC'S.
- FOUR PARALLEL I/O PORTS ON BOARD.
- USES ON BOARD AUDIO AMPS OR YOUR STEREO.
- ON BOARD PROTO TYPING AREA.
- ALL SOCKETS, PARTS AND HARDWARE ARE INCLUDED.
- PC BOARD IS SOLDERMASKED, SILK SCREENED, WITH GOLD CONTACTS.
- EASY, QUICK, AND FUN TO BUILD. WITH FULL INSTRUCTIONS.
- USES PROGRAMMED I/O FOR MAXIMUM SYSTEM FLEXIBILITY.

Both Basic and Assembly Language Programming examples are included.

COMPLETE KIT! **$84.95** (WITH DATA MANUAL)

BLANK PC BOARD W/DATA $31

SOFTWARE:
SCL™ is now available! Our Sound Command Language makes writing Sound Effects programs a SNAP! SCL™ also includes routines for Register-Examine-Modify, Memory-Examine-Modify, and Play-Memory. SCL™ is available on CP/M* compatible diskette or 2708 or 2716 Diskette - $34.95 2708 - $19.95 2716 - $29.95. Diskette includes the source. EPROM'S are ORG at E000H. (Diskette is 8 Inch Soft Sectored)

SPECIAL PURCHASE!

UART SALE!

TR1602B — SAME AS TMS6011, AY5-1013, ETC. 40 PIN DIP

TR1602B

$2.95 EACH **4 For $10.00**

CRT CONTROLLER CHIP
SMC #CRT 5037, PROGRAMMABLE FOR 80 x 24, ETC, VERY RARE SURPLUS FIND. WITH PIN OUT. $12.95 EACH.

4K STATIC RAM

National Semi, MM5257, Arranged 4K x 1, +5V, 18 PIN DIP, A Lower Power, Plug in Replacement for TMS 4044, 450 NS. Several Boards on the Market Will Accept These Rams. SUPER SURPLUS PURCHASE! PRIME NEW UNITS!

8 FOR $16 32 FOR $59.95

NEW! G.I. COMPUTER SOUND CHIP

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SOFTWARE SYSTEMS AND SOLUTIONS FROM SD

Software Dynamics has been offering quality software for 68xx class machines since 1977. We recognize that our customer's needs grow, and design our software to provide a growth path. SD offers compatible single-user, multi-user, and (soon) network systems to meet this need. Programs that run on the single-user system run unmodified on the multi-user and network systems. A virtual terminal driver assures that screen-oriented applications run on any CRT.

The BASIC compiler is the result of 10 years experience in building BASIC interpreters and compilers. Sequential, random and indexed files are supported, along with true BCD numbers to eliminate conversion errors. Long variable names, blocks for structured programming, and true multi-parameter subroutines and string functions aid program construction and maintenance. Compiled programs are both small and very fast, and the source is completely protected.

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SDOS™

- Interrupt-driven DOS
- Read-ahead on sequential files
- LRU buffering optimizes random files
- Byte-addressable, device independent files
- Virtual terminal driver handles any CRT
- Command files
- Keyboard typeahead
- Disk file structure validation program
- Adaptable to any 68xx micro with 40kb or more
- Any combination of floppies or hard disk

SDOS/MT™

- Multi-user version of SDOS
- 1 to 8 users
- User space to 60 kilobytes
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Structured Design BASIC V1.4

- 32 character variable names
- Line labels
- Parameterized, multi-line functions and subroutines
- Full access to SDOS sequential and random file facilities
- Multi-key indexed file option
- Print using with floating dollar sign
- 10 digit fast decimal floating point (no conversion errors!)
- Binary integer arithmetic
- IF-THEN-ELSE, WHILE-DO, ON ERROR DO
- Many other block structure facilities
- COMMON and program chaining
- Super fast execution
- Very compact compiled code
- Complete error trapping

SDOS is available for the following hardware:

Midwest Scientific Instruments 6800
Pace Technology 480
WaveMate Series 2000
Omnibyte 800, 890
Brittania Computing Models 242, 363, 484, 1010
Motorola Exorcisor™

SEDIT

- What-you-see-is-what-you-get editor
- Uses cursor and arrow keys for positioning
- Insert by typing at cursor location
- Delete by RUBOUT at cursor location
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- Tabs
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TYPE

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- User specifies all report formats
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EDIT	Powerful context editor
IDB	ROMable debugger with single step capabilities
MEMTEST	Thorough memory diagnostic
ASM	6800/6809 assemblers
CHESS	For lighter moments

BASIC 1.3, ASM and EDIT are available for 6800 FLEX™, SSB DOS or MDOS™.
SD also offers both 5¼" and 8" Winchester disk drives for Exorcisor systems.

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SMOOTH™ Software

SUPER MODEM PROGRAM

Transmit manually to distant computer

Transmit disk files (text) of any length to distant computer

Receive and save disk files (text) of any length on local disk system. If sending computer does not support an X-on/X-off protocol, then the received files are limited in size by the computer memory.

Tested to transmit and receive text at speeds up to 9600 baud. (CRT terminal must be capable of operating at a baud rate higher than the one the modem is operated at.)

Half duplex option in case distant computer doesn't echo.

Echo option so user can simulate a time sharing system. (Super Modem Program doesn't support auto-answer but the source is provided for those individuals who wish to adapt our program to their special needs.)

Replaces CR with CR/LF (user option) for those using time sharing systems that don't transmit LF's.

Slow disk file transmit (user option) based on character verification for use on time sharing systems to which disk files cannot be sent at speed suggested by the baud rate.

Please specify 6800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8".
Manual and disk with both source and object code 575.00

STANDARD MODEM PROGRAM

Same as Super Modem Program above but without ECHO option, CR/LF for CR option, slow disk file transmit option, nor X-on X-off option. Reception of disk files is limited to those small enough to completely fit within the receiving buffer.

Please specify 6800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8".
Manual with instructions, source listing, and flow chart; disk with both source and object code $45.00

ALL IN ONE
Editor - Text Processor - Mailing Labels
Mailing Lists - Use any CRT terminal and printer

Supports Editing commands such as bottom, change, delete, find, insert (single line) input (multiple lines), list, next, overlay (with cursor editing, character deletion and insertion), overstrike (for selected darker text), print, restart, set, top, underline, up, and verify.

Supports Text Processing commands such as block copy, block move, centering, margin justification (widen and narrow), paging, and tabbing.

Mailing Lists and Labels. Use the same mailing list disk file (with protected areas) for both mailing labels and repeat letters. Repeat letters are personally adressed to each person or selected persons on the mailing list.

Most Powerful File Handler found in any editor. Append one file to the end of another, or insert (merge) one file into another as designated by the line pointer. Print specified lines to your printer or to a disk file. Edit files larger than the text buffer. Does not produce output files when not desired. Delete disk files from the editor.

Printer commands. Control characters can be sent to the printer for format control either directly from the control terminal or by imbedding them in the text. The set command contains interface initialization and character output routines to support the SWTPC MP-C interface as well as the standard serial and parallel interfaces. Jumps are also provided to user supplied printer routines. User selects the port address (0 thru 7, A or B) thereby eliminating the need for the user to install printer software routines. Editor can be initialized for either 4 or 16 addresses per port.

Editor allows exiting to either the monitor or DOS and then reenter (Warm Start) without destroying previously prepared text in the buffer. The Restart command erases contents in the buffer without the user having to reload the Editor.

The Editor allows the user to toggle between full duplex (no echo) and half duplex (echo) as needed. It responds to commands in both upper and lower case and can be used to create assembler source code and Basic programs as well as text.

Specify 6800 SSB, 6800 FLEX™ 6809 FLEX™, 5" or 8" 50.00
Printed source listing is available for an additional 30.00

Software by Technical Systems Consultants, Inc.

Flex™ (includes Editor and Assembler)	150.00
UniFLEX™ (includes one year maintenance and update)	450.00
Editor	50.00
Assembler	50.00
68000 Cross Assembler on 6809	200.00
Text Processor	75.00
Extended Basic	100.00
Basic Precompiler (specify standard or extended)	50.00
Pascal (Flex™)	200.00
Pascal (UniFLEX™ (Add $75.00 for one year's maintenance and update)	225.00
Sort/Merge Package	75.00
6809 Flex™ Utilities	75.00
Debug Package	75.00
Diagnostic Package	75.00

Software by Microware Systems Corp.	YM&U	SOURCE	MANUAL	OBJECT
OS-9™ Level One Operating System	75.00	400.00	40.00	195.00
OS-9™ Level Two Operating System	75.00	N/A	40.00	500.00
BASIC09™	75.00	N/A	25.00	195.00
OS-9™ Macro Text Editor		300.00	15.00	125.00
OS-9™ Interactive Assembler		300.00	10.00	125.00
OS-9™ Interactive Debugger (Disk version)		100.00	10.00	50.00
CIS CoBol Compiler		N/A	80.00	695.00
Pascal Compiler		N/A	40.00	400.00

Dynamite Disassembler 60.00
SUPER SLEUTH Disassembler System 99.00

SWTPC	Kit	Assembled
DC-2 Disk Controller (Limited Quantity)	N/A	125.00
4K RAM Board (Limited Quantity)	30.00	40.00
MP-S Single port serial interface (Limited Quantity)	40.00	60.00
MP-S2 Serial interface (dual port)	N/A	120.00
MP-LA Parallel interface (dual port)	40.00	60.00
MP-L2 Parallel interface (dual port)	N/A	120.00
MP-R Single voltage 2716 prom programmer	N/A	114.50
MP-N Calculator board	54.95	92.00
MP-T Interrupt timer	N/A	92.00
MP-6M 8K 4044 Memory board (limited quantity of six)	180.00	275.00
S32 Universal Static Memory Board	N/A	124.50
MP-09 6809 CPU board	N/A	295.00
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Universal 68XX Bare Motherboard. 6800/6809, 4/16 addresses per port, 8 50 pin/8 30 pin slots, baud rate generator, 15 1/8" x 9 3/8" 60.00
F & D (bare) Motherboard I. 12 50 pin/8 30 pin slots, 4/8 (modifiable to 16) addresses per port, complete address decoding, 18" x 9" 55.00
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Male with square cross section pins each .50
Female each .75

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ELEKTRA™ SS50 Computer Products

	Bare Board	Kit	Assembled
DPS Dual Port Serial Interface Board and Doc.	20.00	60.00	80.00
DPP Dual Port Parallel Interface Board and Doc.	20.00	60.00	80.00
Cable (Two required for each interface)			20.00
MB Motherboard and documentation	65.00	N/A	N/A
CPU-8/9 6808-6809 CPU (Run 6800 or 6809 softwa e) (6808 is 6800 software compatible)	50.00	225.00	275.00
HUMBUG (from STAR-KITS) for CPU-8/9 board			
2K version for 6800 (6808)			40.00
HUMBUG-09 for 6809			75.00
Other HUMBUG versions including video versions are available. (Specify system)			
Chassis (0.090" aluminum, inside dimensions 21 7/8" x 18 1/2" x 8 3/4", 2 cutouts for 5 1/4" disk drives, drive mount, line cord, line fuse, key (power) switch, reset switch, abort switch, 70 cfm fan, EMI filter, 10 RS-232 cutouts) and power supply (15a 8v, 3a 16v, 3a -16v), use any current SS-50 or SS-50C motherboard, choice of disk regulator board with cables or 2 filler plates			450.00
220v version of above for export		add	50.00
Chassis without power supply, disk regulator, nor filler plates			250.00
Power supply (15a 8v, 3a 16v, 3a -16v) 110v			175.00
Power supply (15a 8v, 3a 16v, 3a-16v) 220v			225.00
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Filler plate for 5-1/4" cutout			10.00
Filter (fan)			10.00
5 1/4" DISK DRIVES with 30 day guarantee			
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Double head, single or double density capability, 40 X 2 tracks			335.00
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MPI - Service Manual			20.00
ELEKTRA Dual drive cabinet for 5 1/4" drives with power supply, line cord, fuse, power switch, and power cables to drives			125.00
Dual Drive cabinet and power supply for 8" drives			350.00
Microtime 6800 Calendar and Clock Board (assembled and tested)			105.00
Bareboard, connector, and documentation only of above (See review Feb. 1980 '68 Micro Journal)			35.00
Microtime II			89.95
Data Mart 16K EPROM bareboard (2708 chips)			30.00
Printers			
Epson MX-80(Centronics compatible parallel interface)			495.00
(with Serial RS-232 interface option)		add	75.00
Spare Print Head			39.95
Spare ribbon cartridge			15.00
C. Itoh Comet I 125 cps, 9 x 7, bidirectional, serial or parallel			445.00
GIMIX (The Ultimate)			
6800 CPU Board			224.03
with timers			288.06
with baud rate option		add	30.00
with 2MHz option		add	15.00
2 MHz 6809 Plus CPU, time of day clock, battery backup, 1K NMOS		AM	578.05
CMOS AM substitution			8.00
GIMIX Dynamic Address Translator			35.00
SWPTC compatible DAT			15.00
9511A Arithmetic Processor (4MHz)			312.00
9512 Arithmetic Processor (3MHz)			265.00
GMXBUG-09 (Terminal Based) 1K scratchpad required			98.65
Bootstrap Pr			30.00
Video Prom (includes bootstrap)			30.00
Manual and Source Listing only			38.62
Missing cycle detect card			38.23
Disk Controllers (All have data separators and can be used with either single or double headed drives)			
5" single density controller without 1771 chip			158.38
8" single density controller complete			198.48
5" and 8" single density controller complete			226.58
5" double density controller with variable precomp			348.28
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GIMIX version of FLEX™ (without Editor and Assembler)			90.00
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Ribbon cable for two 8" disk drives (long)			44.26
8" disk drive cabinet with power supply			798.18

Memory	CMOS WITH BAT. BACKUP	NMOS NO BAT. BACKUP
16K Static RAM Board with control registers**		388.16
32K Static RAM Board with 16K of RAM installed*		298.12
**discontinued, limited quantity available		
64K Static RAM Board with 24K of RAM installed	N/A	348.27
64K Static RAM Board with 32K of RAM installed	648.36	398.37
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8 port 50 pin parallel interface with interrupt generator	198.45
Cable sets for above boards (specify board)	22.95
Video Boards	
64 or 32 X 16	198.71
80 X 24 without RAM character generator	398.74
80 X 24 with RAM character generator	458.76
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2MHz 6809 PLUS Computer System with 56K Memory*	2498.29
Above System with #58 Controller and Special Software Pkg.*	2988.59
Above System with #68 Controller and Special Software Pkg.*	3248.49
*with CMOS RAM and Battery Backup	add 300.00
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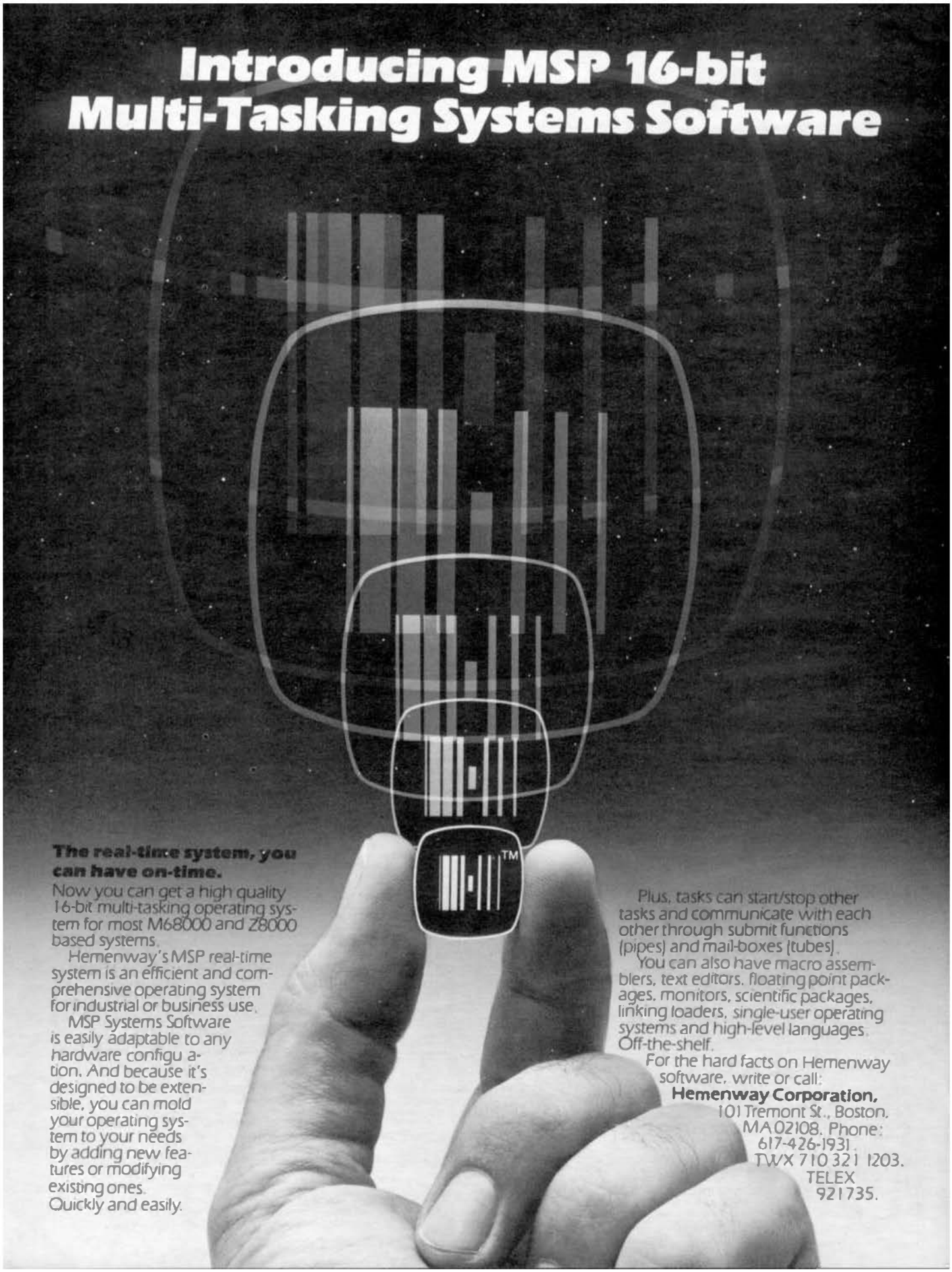
Introducing MSP 16-bit Multi-Tasking Systems Software



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Now you can get a high quality 16-bit multi-tasking operating system for most M68000 and Z8000 based systems.

Hemenway's MSP real-time system is an efficient and comprehensive operating system for industrial or business use.

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THE CHIEFTAIN™ 5¼-INCH WINCHESTER HARD DISK COMPUTER

SO ADVANCED IN SO MANY WAYS . . . AND SO COST-EFFECTIVE . . . IT OBSOLETES MOST OTHER SYSTEMS AVAILABLE TODAY AT ANY PRICE.

● HARD DISK SYSTEM CAPACITY

The Chieftain series includes 5¼- and 8-inch Winchesters that range from 4- to 60-megabyte capacity, and higher as technology advances. All hard disk Chieftains include 64-k memory with two serial ports and DOS69D disk operating system.

● LIGHTNING ACCESS TIME

Average access time for 5¼-inch Winchesters is 70-msec, comparable to far more costly hard disk systems. That means data transfer *ten-times faster* than floppy disk systems.

● 2-MHZ OPERATION

All Chieftains operate at 2-Mhz, regardless of disk storage type or operating system used. Compare this to other hard disk systems, no matter ***how*** much they cost!

● DMA DATA TRANSFER

DMA data transfer to-and-from tape and disk is provided for optimum speed. A special design technique eliminates the necessity of halting the processor to wait for data which normally transfers at a slower speed, determined by the rotational velocity of the disk.

● RUNS UNDER DOS OR OS-9

No matter which Chieftain you select . . . 5¼- or 8-inch floppy, or 5¼- or 8-inch Winchester with tape or floppy back-up . . . they ***all*** run under DOS or OS-9 with ***no need*** to modify hardware or software.

● UNBOUNDED FLEXIBILITY

You'll probably never use it, but any Chieftain hard disk system can drive up to 20 other Winchesters, and four tape drives, with a single DMA interface board!

● SMOKE SIGNAL'S HERITAGE OF EXCELLENCE

This new-generation computer is accompanied by the same ***Endurance-Certified*** quality Dealers and end-users all over the world have come to expect from Smoke Signal. And support, software selection and extremely competitive pricing are very much a part of that enviable reputation.

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The Chieftain Computer Systems:

Here are the Chieftain 6809-based hard disk computers that are destined to change the data processing industry . . .

☐ **CHIEFTAIN 95W4**
4-megabyte, 5¼-inch Winchester with a 360-k floppy disk drive (pictured).

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4-megabyte, 5¼-inch Winchester with a 750-k octo-density floppy disk drive.

☐ **CHIEFTAIN 98W15**
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48K 2MHz STATIC RAM/ROM CARD

*24 2K blocks memory mapped on any 2K boundary
*uses low power 2016P-2 (2128) RAM and/or 2716 ROM
*mix 4K blocks of RAM and ROM
*6800 and 6809 compatible
*use on SS-50 and SS-50C buss
*decoded for extended addressing
*5 volts only
*low power consumption (typ. ½ amp with 48K RAM)
*gold connectors

Bare Board $49.00 2716 1MHZ $9.95 2016 P-2 2MHZ $16.50

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A/T without memory chips $120.00

NEW ACCESSORIES FOR 68XX USERS:

SS-50/SS-50C EXTENDER CARD	$35.00
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*Both cards assembled with a built in logic aid & gold edge connectors	
SS-30 WIRE-WRAP/PROTOTYPE BOARD (board only)	$20.00
*Pad spacing permits most standard sockets from 8 to 64 pins	
*Provision has been made for voltage regulators	

FEATURED PRODUCT: **SP-1 Bare card $49.00 Asm. + tested $195.00**

*A super prototype board *Card design includes
(3) 6821 6 parallel ports
(4) 6850 4 serial ports
(1) 6840 3 16 bit counter/timers
which are fully buffered and decoded
*Accomodates a mix of 38, 14 & 16 pin wire wrap sockets
*Pad spacing permits most standard sockets from 8 to 64 pins

MODEM CARD	B/C	$ 49.00
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A/T without extra features		$325.00
*SUPER CPU assembled with source listing without 2K EPROMS (2-2708)		$235.00
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*VIDEO RAM bare, doc, Xtal, src.		$ 49.00
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*PARALLEL I/O bare card & doc.		$ 49.00
*SS-50 WIRE-WRAP/PROTOTYPE bare		$ 39.00
*TRANSITION CARD asm.		$ 95.00
*TRANSITION CARD bare		$ 49.00

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*16 position SS-50	$80.00
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JUDGE THE REST, THEN BUY THE BEST

Only GIMIX offers you **SOFTWARE SWITCHING** between **MICROWARE's OS-9** and **TSC's FLEX.** Plus you get the power of the GMXBUG system monitor with its advanced debugging utility, and memory manipulation routines. A wide variety of languages and other software is available for these two predominant 6809 Disk Operating Systems.

You can order a system to meet your needs, or select from the 6809 Systems featured below.

JUDGE THE FEATURES AND QUALITY OF GIMIX 6809 SYSTEMS

GIMIX' CLASSY CHASSIS™ is a heavyweight aluminum mainframe cabinet with back panel cutouts to conveniently connect your terminals, printers, drives, monitors, etc. A 3 position keyswitch lets you lock out the reset switch. The power supply features a ferro-resonant constant voltage transformer that supplies 8V at 30 amps, + 15V at 5 amps, and – 15V at 5 amps to insure against problems caused by adverse power input conditions. It supplies power for all the boards in a fully loaded system plus two 5 ¼" drives (yes! even a Winchester) that can be installed in the cabinet. The Mother board has fifteen 50 pin and eight 30 pin slots to give you the most room for expansion of any SS50 system available. 11 standard baud rates from 75 to 38.4K are provided and the I/O section has its own extended addressing to permit the maximum memory address space to be used. The 2 Mhz 6809 CPU card has both a time of day clock with battery back-up and a 6840 programmable timer. It also contains 1K RAM, 4 PROM/ROM/RAM sockets, and provides for an optional 9511A or 9512 Arithmetic Processor. The RAM boards use high speed, low power STATIC memory that is fully compatible with any DMA technique. STATIC RAM requires no refresh timing, no wait states or clock stretching, and allows fast, reliable operation. The system includes a 2 port RS232 serial interface and cables. All GIMIX boards use gold plated bus connectors and are fully socketed. GIMIX designs, manufactures, and tests in-house its complete line of products. All boards are twice tested, and burned in electrically to insure reliability and freedom from infant mortality of component parts. All systems are assembled and then retested as a system after being configured to your specific order.

56KB 2MHZ 6809 SYSTEMS WITH GMXBUX/FLEX/OS-9 SOFTWARE SELECTABLE

With #58 single density disk controller **$2988.59**
With #68 DMA double density disk controller **$3248.49**
to substitute Non-volatile CMOS RAM with battery back-up, add 300.00
for 50 Hz export power supply models, add 30.00

Either controller can be used with any combination of 5" and/or 8" drives, up to 4 drives total, have data recovery circuits (data separators), and are designed to fully meet the timing requirements of the controller I.C.s.

5 ¼" DRIVES INSTALLED IN THE ABOVE with all necessary cables

	SINGLE DENSITY		DOUBLE DENSITY		
	Formatted	Unformatted	Formatted	Unformatted	
40 track (48TPI) single sided	199,680	250,000	341,424	500,000	2 for **$700.00**
40 track (48TPI) double sided	399,360	500,000	718,848	1,000,000	2 for **900.00**
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Chart shows total capacity in Bytes for 2 drives.

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NOTE: UNIFLEX can not be used with 5" minifloppy drives.

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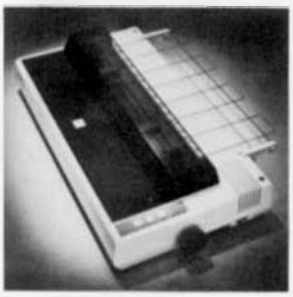

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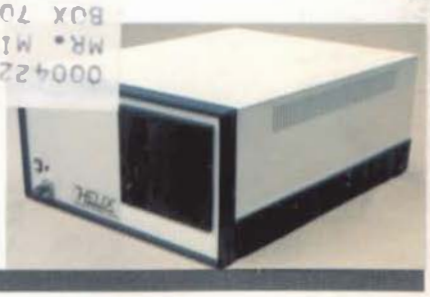

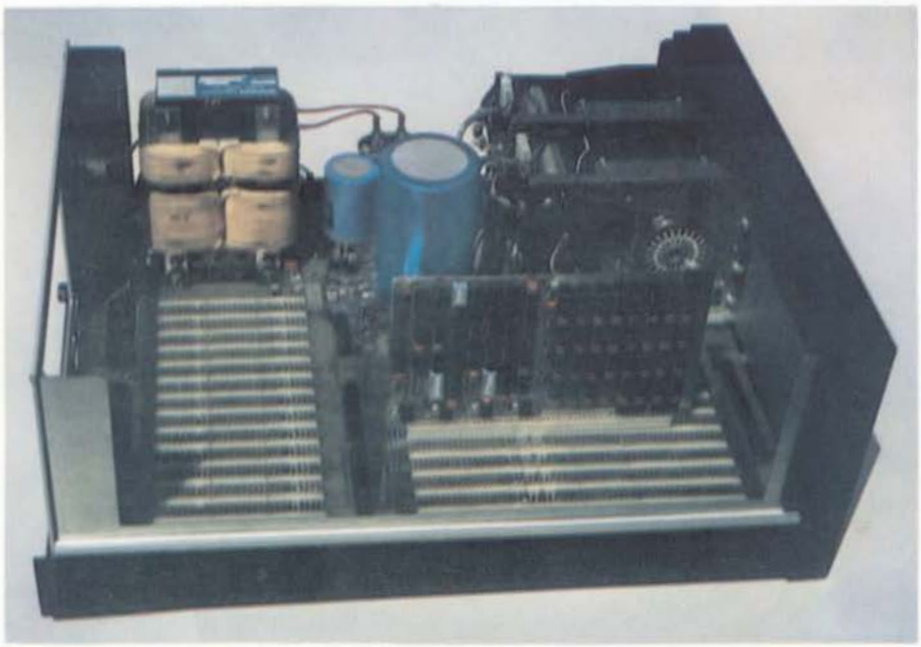

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